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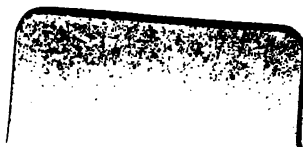
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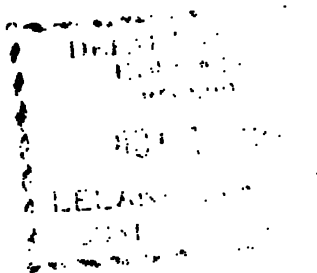
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LELAND STANFORD JUNIOR UNIVERSITY
SECOND SERIES BULLETIN NUMBER 91

ANNOUNCEMENT OF COURSES
1916-17

MAY, 1916



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STANFORD UNIVERSITY, CALIFORNIA

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STANFORD UNIVERSITY
PRESS

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UNIVERSITY CALENDAR

1916

Aug. 28 Monday.....Registration of Graduate Students
Aug. 29 Tuesday.....}Registration of Undergraduates.
Aug. 30 Wednesday.....}
Aug. 31 Thursday.....Instruction begins.
Nov. 30 Thursday.....}Thanksgiving Recess.
Dec. 3 Sunday.....}
Dec. 14-20 Thursday-Wednesday. End-Semester Examinations.

1917

Jan. 8 Monday.....Registration of Graduate Students
Jan. 9 Tuesday.....Registration of Undergraduates.
Jan. 10 Wednesday.....Instruction begins.
Feb. 22 Thursday.....Washington's Birthday.
March 9 Friday.....Founders' Day.
March 31 Saturday.....}Mid-Semester Recess.
April 8 Sunday.....}
May 10-16 Thursday-Wednesday. End-Semester Examinations.
May 14 Monday.....Birthday of Leland Stanford, Junior.
May 20 Sunday.....Baccalaureate Sunday.
May 21 Monday.....Commencement.

COURSES OF INSTRUCTION

GREEK

AUGUSTUS TABER MURRAY, Professor.

ERNEST WHITNEY MARTIN, Associate Professor.

[With the co-operation of Professor FAIRCLOUGH of the Department of Latin.]

UNDERGRADUATE COURSES

Instruction in the lower classes is given chiefly by means of recitations, but as the student advances these are supplemented by lectures. In courses 1, 2, 3, 13, and 14 the work is arranged so as to provide as far as possible individual instruction for each student. In this way it has been found possible to read more widely, while at the same time there is a distinct gain in thoroughness.

The **TEACHER'S RECOMMENDATION**.—Courses 2, 3, 4, and 15 (or equivalents) constitute the minimum requirement for the high school teacher's recommendation in Greek.

1. Elementary.—Grammar; translation of easy prose; Greek composition. After the essential grammatical forms have been mastered, the students are led to read as widely as possible in simple narrative prose, including Xenophon's *Anabasis*, selections from the Gospels, and Cebes' Tablet. The course includes systematic drill in the ordinary forms of syntax, and exercises in writing Greek are regularly introduced. Two divisions.

3 to 5 units, both semesters (MARTIN, MURRAY)

MTWThF 9:15, 1:30

2. Simple Attic Prose.—Selections from prose writers, adapted to the needs of individual students. Open to those who have offered Greek for entrance, or who have completed course 1 in the University. Students who have completed course 14 may take this course on recommendation of the instructor. In this course each student meets regularly with one of the instructors for direct personal instruction.

3 units, 1st semester (MARTIN)

MWF 8:15

2a. The Iliad.—A course parallel to course 2, and like it open to students who have completed course 1. The student is introduced to the study of Homer, and as much as possible of the *Iliad* is read.

3 units, 1st semester (MURRAY)

MWF 10:15

3. **The Odyssey.**—A continuation of course 2a, similarly conducted.
3 units, 2d semester (MURRAY) MWF 10:15
4. **Prose Composition.**—Systematic training in the writing of simple Greek with exercises in sight translation. Required of Greek major students in connection with courses 2 and 3.
2 units, 1st semester (MARTIN)
7. **Modern Greek.**—Grammar, exercises, simple reading in current newspapers, etc. Wider reading in modern Greek literature and translations.
2 units, 2d semester (MARTIN) TTh 10:15
- 7b. **Modern Greek.**—A continuation of course 7.
1 unit, 1st semester (MARTIN)
8. **Lucian.**—Selections for rapid reading.
2 units, 1st semester (MARTIN)
9. **The Greek Anthology.**—Selections for rapid reading.
2 units, 2d semester (MARTIN)
11. **Greek Tragedy.**—The Prometheus Bound and Agamemnon of Aeschylus, with the Antigone of Sophocles and the Iphigenia Taurica of Euripides, read and interpreted, with lectures on Greek dramatic art from time to time.
3 units, both semesters (MURRAY) MWF 11:15
13. **Rapid Reading.**—The student and instructor meet weekly for individual reading in easy Greek, suited to the student's particular needs. Open to all who have had at least one semester of Elementary Greek.
1 to 3 units, both semesters (MURRAY, MARTIN)
By arrangement
14. **Introductory.**—A rapid introduction to the Greek language, followed as soon as possible by the reading of the Gospel of John. Open to all students, and intended primarily for those who mean to take but a few courses in Greek.
3 units, 2d semester (MURRAY) MWF 11:15
15. **Teachers' Course.**—Lectures on methods and texts, with practice teaching.
2 units, 2d semester, (MURRAY) By arrangement
16. **Theocritus.**—A study of the Idylls, with lectures on Alexandrian poetry.
2 units, 2d semester (FAIRCLOUGH)

GRADUATE COURSES

The center of the Graduate work is the Greek Seminary—made up of the director and such students as satisfy him of their fitness for the work. The Seminary meets weekly for the critical interpretation of some Greek author, the different members, in turn, filling the post of interpreter. Topics for investigation are assigned, and papers prepared by the members are read and discussed.

Members of the Seminary are expected to supplement their critical work by wide reading, and lectures on the author or authors under discussion are given by the director. It is in the highest degree desirable that all members of the Seminary should be able to read both French and German, and this is indispensable in the case of those who are candidates for the degree of Doctor of Philosophy.

17. The Greek Seminary.—In 1916-17 the Seminary will be devoted to the study and interpretation of representative Greek Tragedies.

2 to 4 units, both semesters (MURRAY, MARTIN)

18. Rapid Reading.—Graduate and advanced students will meet regularly for the rapid reading of the Tragedies discussed in the Seminary.

2 to 4 units, both semesters (MURRAY, MARTIN)

SPECIAL COURSES

In addition to the above courses the following are given, intended primarily for general students. They do not presuppose a knowledge of Greek, and they do not count as part of the major work for students in Greek. The courses are open to incoming freshmen only with the consent of the lecturer.

19. The Greek Epic.

2 units, 1st semester (MURRAY)

TTh 10:15

20. Greek Tragedy.

2 units, 2d semester (MURRAY)

TTh 10:15

21. Greek Sculpture.—Lectures, illustrated with photographs and lantern slides, on the history and character of Greek sculpture.

2 units, 1st semester (FAIRCLOUGH)

TTh 11:15

22. Greek Literature.—Representative types, tracing the development of Greek literature, studied in English translations. Informal lectures from time to time.

3 units, 2d semester (MARTIN)

MWF 11:15

23. New Testament Literature.—A critical introduction to the literature of the New Testament. Lectures, with assigned readings.

2 units, 1st semester (MURRAY) TTh 11:15

24. History of Greece.—A general outline course to the death of Alexander the Great. Lectures, with readings from the sources in translation. Open to all students.

3 units, 1st semester (MARTIN) MWF 8:15

26. Seminary.—A study of the classical tradition in the early American poets, 1625-1807.

2 units, both semesters (MARTIN) Th 2:30-4:30

LATIN

HENRY RUSHTON FAIRCLOUGH, Professor.

JEFFERSON ELMORE, BENJAMIN OLIVER FOSTER, Associate Professors.

———, ———, Graduate Assistants.

[With the co-operation of the Greek Department, and of Professor HEMPL of the Department of Germanic Languages.]

UNDERGRADUATE COURSES

The aim of the undergraduate courses in Latin is to give the student a somewhat systematic knowledge of the language and its development, an acquaintance with the representative authors of Latin literature, and some insight into the life, culture, and civilization of ancient Rome.

The Department recognizes two classes of major students: (1) those who wish to pursue a course of liberal studies, including Latin as a prominent feature; (2) those who, expecting to teach Latin, desire to be properly equipped for that purpose.

Students who wish to qualify for teaching Latin must take courses 3, 4, 6, 7, 8, 9, 10, 11, and 17, together with such other courses as are recommended by the Department. To other students more freedom of choice is allowed.

1. Introductory.—The course is given for students who desire at least one year of Latin and for those who wish to begin the subject with a view to further study.

3 units, both semesters (———) MWF 1:30

2. Cicero and Virgil.—Cicero, selected orations; Virgil, selected books of the *Æneid*. This course is planned for those who have passed in course 1 or entrance subject 8a.

3 units, both semesters (———) MWF 11:15

3. Terence and Cicero.—Terence, *Andria*; Cicero, *De Senectute*. In addition to the study of these Latin texts, the course includes instruction on the general character and development of Roman literature. Open in either semester to students who have completed course 2, or who have offered entrance subject 8b. Two sections.

3 units, 1st semester (FOSTER) MWF 8:15, 9:15

4. Catullus and Horace.—Selections from Catullus; Horace, *Odes* and *Epodes*. A course complementary to course 3. Two sections.

3 units, 2d semester (FOSTER) MWF 8:15, 9:15

5. Legal Latin.—The Institutes of Gaius or Justinian are read both as a training in language and as an introduction to the main principles of Roman law. The course is useful to all who desire a first-hand knowledge of Roman law and of the origins of European social institutions. Open to any students who have had two years of Latin.

2 units, both semesters (FAIRCLOUGH) TTh 10:15

6. Prose Composition I.—Practical exercises and rapid reading of easy prose. Open in either semester to first-year students.

2 units, both semesters (FOSTER) TTh 11:15

7. Horace.—Satires and Epistles. Open to those who have completed course 3 or 4, or an equivalent. Attention is directed especially to the style and subject matter, to Horace's influence on later literature, and to the salient features of the Augustan age.

3 units, 1st semester (FAIRCLOUGH) MWF 10:15

8. Livy and Tacitus.—Selections from Livy's *History*; the *Agriкола* of Tacitus. This course, complementary to course 7, involves a survey of Roman history and the literature of the early empire.

3 units, 2d semester (ELMORE) MWF 10:15

9. Oral Latin.—Practice in speaking and in the direct method of teaching.

2 hours, 1 unit, 2d semester (FOSTER) TTh 9:15

10. Roman Comedy.—The *Trinummus* and the *Captivi* of Plautus, and either the *Menaechmi* or Terence's *Hauton Timorumenos*. Attention is paid to early forms, constructions, and meters, and to the staging of a Roman play, with some consideration of the later history of comedy.

2 units, 1st semester (FOSTER) TTh 8:15

11. The Letters of Cicero.—Selections from the correspondence are read with a view to obtaining a conception of Cicero's character as a

man and to becoming acquainted, as far as possible, with the social and political conditions of the time.

2 units, 2d semester (FOSTER) TTh 8:15

12. Lucretius.—Selections from the *De Rerum Natura* are read with particular attention to the philosophic thought and its poetic treatment.

3 units, 1st semester (FOSTER) [Not given in 1916-17.]

13. Prose Composition II.—An advanced course, suitable for those who expect to teach Latin.

1 unit, 2d semester (FAIRCLOUGH) M 9:15

14. Juvenal and Martial.—Selections from the *Satires* of Juvenal and the *Epigrams* of Martial, with supplementary reading in other writers of the first century.

2 units, 1st semester (FAIRCLOUGH) WF 9:15

16. Quintilian.—Book X. Rhetoric and literary criticism among the Romans, with a survey of Greek and Roman literature.

2 units, 2d semester (FAIRCLOUGH) WF 9:15

17. Teachers' Course.—Lectures on methods of teaching Latin, with practical exercises. Open only to advanced students.

2 units, 2d semester (ELMORE) M 2:30-4:30

GRADUATE COURSES

These courses are open to graduates in Latin, and are most profitable to those who have had some undergraduate work in Greek. The ability to read French and German is also very desirable, and, in the case of candidates for the degree of Ph.D., necessary. The aim of the course is to give the student a thorough grasp and detailed knowledge of particular authors, and of certain periods and fields of literary activity, as well as a training in literary criticism, and an acquaintance with the methods of original research.

22. Latin Seminary.—In 1916-17 the Seminary will be devoted to Horace and Lyric Poetry. All of Horace's poems will be read, and selected passages interpreted. Attention will be paid both to Greek exemplars and to Horace's influence on later literature. Students should provide themselves in advance with a complete text of Horace, such as that in the Oxford or Teubner series.

2 to 6 units, both semesters (FAIRCLOUGH) F 2:30

23. Caesar.—The Gallic and Civil Wars. Readings and reports. Intended for prospective teachers.

2 units, both semesters (FOSTER) T 2:30

25. Introduction to Latin Palaeography.—Lectures and practice in reading facsimiles of manuscripts.

1 unit, 1st semester (FOSTER) T 3:30

26. Introduction to Latin Epigraphy.—Lectures and readings in Latin inscriptions.

1 unit, 2d semester (FAIRCLOUGH) T 3:30

28. Etruscan.—Lectures on the nature of the language and its relation to other Italic dialects.

2 units, 2d semester (HEMPL)

29. Studies in Roman History.—This advanced course takes up the consideration of special problems. Open by permission of the instructor to those who have had Latin 30 or an equivalent.

2 units, 1st semester (ELMORE) [Not given in 1916-17.]

SPECIAL COURSES

30. History of Rome.—A general course, open to all students.

3 units, 2d semester (ELMORE) MWF 8:15

31. Roman Art and Archaeology.—A survey of the topography, architecture, sculpture, and other art-forms of ancient Rome, illustrated with lantern-slides. This course is open to all, but first-year students must receive special permission from the instructor before registering.

2 units, 2d semester (FAIRCLOUGH) TTh 11:15

32. Latin Literature.—Lectures on the principal poets and prose writers, with assigned readings in English translations. Open to all students.

2 units, 1st semester (FOSTER) [Not given in 1916-17.]

34. Journal Club.—Advanced students will meet once or twice a month for a consideration of articles appearing in current periodicals.

1 unit, both semesters (FAIRCLOUGH)

GERMANIC LANGUAGES

GEORGE HEMPL, JAMES OWEN GRIFFIN, Professors.

KARL GUSTAV RENDTORFF, WILLIAM ALPHA COOPER, Associate Professors.

BRUNO BOEZINGER, CHARLOTTE A. KNOCH, Assistant Professors.

CHARLES REINING, Instructor.

The advanced courses are intended both for the maturer undergraduate and for candidates for the degrees of Master of Arts and Doctor

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PRESS

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b. Goethe's Faust: Urfaust, Fragment of 1790, Part First and Part Second.

3 units, both semesters (COOPER) [Not given in 1916-17.]

c. Goethe's Tasso.—Study of sources.

1st semester (COOPER) F 2:30

12. Advanced German Grammar.—A systematic presentation of the important facts of German grammar, together with individual investigations of the usage of various writers.

a. Orthography, Phonology, and Morphology.

2 units, both semesters (HEMPL) TTh 1:30

b. Syntax. Course conducted in German.

2 units, 1st semester (COOPER) TTh 10:15

13. The History of German Literature.—Lectures and readings.

a. From the earliest times to the eighteenth century.

2 units, both semesters (RENTORFF) TTh 8:15

b. The eighteenth and nineteenth centuries.

2 units, both semesters (RENTORFF) [Not given in 1916-17.]

c. The Works of Gerhard Hauptmann.

(RENTORFF) By arrangement

14. Teachers' Course.—Lectures on the various methods employed in teaching modern languages, together with practice in the conducting of classes. It is recommended that this course be taken the year before "Practice Teaching." Practice section conducted in German.

3 units, 2d semester (HEMPL, COOPER) M 1:30; F 1:30-3:30

15. The Genesis of Grammar.—Lectures on the origin and development of the parts of speech and of other grammatical apparatus.

2 units, 1st semester (HEMPL) WF 1:30

16. The Genesis of Writing.—Lectures on the origin and development of writing, with special reference to European systems.

2 units, 1st semester (HEMPL) [Not given in 1916-17.]

17. Middle-High German.

a. Grammar and selected texts.

2 units, both semesters (RENTORFF) TTh 9:15

b. Advanced Middle-High German.

2 units, both semesters (RENTORFF) By arrangement

18. Old-High German.

2 units, both semesters (BOEZINGER) [Not given in 1916-17.]

19. Old Norse.

2 units, 2d semester (HEMPL) [Not given in 1916-17.]

20. Gothic.

2 units, both semesters (BOEZINGER) By arrangement

21. The Runes.—Lectures on the origin and development of primitive Germanic writing.

2 units, 1st semester (HEMPL) By arrangement

22. The History of German Civilization.—This course is intended for students of German who wish to become acquainted with the development of German civilization in its relation to German literature. Lectures with stereopticon.

2 units, both semesters (RENDTORFF) W 2:30-4:30

23. Thesis Course.—Special investigations and reports intended primarily to furnish undergraduates a training in preparation for original research work. Under the direction of the various members of the staff. Credit subject to individual adjustment.**26. Practice in Teaching.**—A limited number of major students who have taken the German Teachers' Course may arrange for practice in teaching in connection with the work in German 1 and German 2. The course should be registered for as "Education 26." Course conducted in German.

4 units, either semester (COOPER, KNOCH) By arrangement

27. Phonetics.—Lectures and drill in general phonetics, for students of ancient or modern languages, including English.

2 units, 2d semester (HEMPL) By arrangement

[See also course 28 in the Department of Latin.]

ROMANIC LANGUAGES

OLIVER MARTIN JOHNSTON, Professor.

CLIFFORD GILMORE ALLEN, AURELIO MACEDONIO ESPINOSA, Associate Professors.

†ROBERT EDOUARD PELLISSIER, STANLEY ASTREDO SMITH, Assistant Professors.

✓ LOUIS PETER DE VRIES, GABRIEL HENRY GROJEAN, Instructors.

EDMUND VERNON GAGE, EUGENE JEAN OBERLÉ, JOHN SELLARDS, Assistants.

The undergraduate courses in the Romanic Languages are planned so as to give students an intimate acquaintance with the modern forms

†Absent on leave, 1916-17.

of the languages spoken in the principal neo-latin countries. To this end systematic attention is paid to pronunciation, reading, syntax, and conversation. In the higher courses special emphasis is laid on the study of literature. In order to give students an opportunity to become familiar with the spoken idioms, several of the advanced courses are conducted as far as possible in the language which forms the object of study.

The Department recognizes two classes of major students: (1) students who expect to teach French or Spanish and who wish to take up the study from the point of view of the specialist; (2) students who desire to group a course of study of a general nature around that of French or Spanish.

Either French or Spanish may be selected as a major subject. Majors in either of these subjects will be required to complete forty units in the Department exclusive of the elementary course in the major subject.

In addition major students who intend to teach either French or Spanish will be expected to take at least the elementary course in one of the other Romanic languages. A reading knowledge of Latin and German is also highly desirable.

THE TEACHER'S RECOMMENDATION.—The minimum requirement for the High School recommendation is as follows: In French—courses 2, 3, 6, 17, and six units selected from courses 7, 8, 9, 18, 19, 21; in Spanish—courses 10, 11, 12, 13, 14, 24, and 22 or 23. The Department will insist also on course 26. Recommendations will be given only on the vote of the Department, and will demand a degree of scholarship above the ordinary passing mark.

COURSES FOR UNDERGRADUATES

1a. Elementary French.—Fraser and Squair, *French Grammar*, with written and oral exercises and systematic training in French pronunciation; Aldrich and Foster's *French Reader*.

3 units, both semesters (DE VRIES) MWF 9:15, 11:15

1b. Elementary French, Reading Course.—The course is intended for students who merely desire to obtain a reading knowledge of the language. Aldrich and Foster, *Foundations of French*; Aldrich and Foster's *French Reader*; Mérimée, *Colomba*.

3 units, both semesters (GROJEAN) MWF 10:15

[Courses 1a and 1b are continuous courses, open to all, but students desiring to enter after the end of the second week will be admitted only upon special examination.]

2. French Composition and Conversation.—The course will be conducted as far as practicable like the corresponding course in English composition, a part of each hour being devoted to conversation. Open to students who have completed course 1a, or who have received credit for entrance subject 6a.

3 units, both semesters (SMITH, GROJEAN) MWF 8:15, 10:15

3. Modern French Reading.—Reading of selected texts in prose and verse. In addition, some 300 pages of easy prose will be assigned each semester for outside reading. Open to students who have completed course 1a or course 1b, or who have received credit for entrance subject 6a.

2 units, both semesters (DE VRIES, SELLARDS) TTh 9:15, 10:15

4. French Pronunciation.—Practice in French pronunciation with the phonograph, open to students registering for course 2. One class exercise and two practice hours each week for one semester.

1 unit, either semester (DE VRIES) M 1:30

[Courses 2, 3, and 4 constitute the second year's work in French, and should, if possible, be taken during the same year. Course 4 may not precede course 2.]

5. Reading and Writing of French.—Vreeland and Koren, French Syntax and Composition. An intermediate course in reading and composition intended primarily for students entering with entrance subjects 6b or 6c.

3 units, both semesters (GROJEAN) MWF 9:15

6. Advanced French Prose Composition.—Translation into French of selected English prose. Open to students who have completed course 2 or course 5.

2 units, both semesters (GROJEAN) TTh 8:15

7. French Literature in the Seventeenth Century.—Lectures, reports, discussions, outside reading. Conducted in English.

3 units, both semesters (SMITH) MWF 9:15

8. Lectures on Modern France.—The lectures will be in French. There will be outside reading and reports. Prerequisites: courses 2 and 3, or course 5, or their equivalent.

2 units, 1st semester (GROJEAN) TTh 10:15

9. Introduction to the History of French Civilization.—Lectures in French. Outside reading and reports. Prerequisites as above.

2 units, 2d semester (GROJEAN) TTh 10:15

10. Elementary Spanish.—The elements of grammar, composition, and conversation; reading, translation, and conversation based on Spanish texts. A continuous course open to all.

3 units, both semesters (ALLEN, GAGE, SELLARDS, OBERLÉ, SMITH)
MWF 8:15, 9:15, 10:15, 11:15

11. Second-year Spanish Composition and Conversation.—Review of grammar, with composition and conversation. Conducted entirely in Spanish. Open to students who have completed course 10, or its equivalent.

3 units, both semesters (ESPINOSA) MWF 8:15, 9:15

12. Modern Spanish Reading.—Reading of selected texts in prose and verse. Open to students who have completed course 10 or who have received credit for entrance subject 5a.

2 units, both semesters (ALLEN, ESPINOSA) TTh 9:15, 11:15

13. Advanced Spanish Composition and Conversation.—(a) Reading of Spanish texts with exercises in composition and abundant oral drill. (b) Translation into Spanish of selected English prose. Open to students who have completed course 11 or its equivalent.

2 units, both semesters (ESPINOSA) TTh 9:15

14. Classical Spanish.—A study of the principal authors of the classical period. Representative texts will be read of Cervantes, Lope de Vega, Calderón, Alarcón, Tirso de Molina, as well as selections from Ford's *A Spanish Anthology*. Open to students who have completed courses 11 and 12 or their equivalent.

3 units, 1st semester (ALLEN) MWF 8:15

15. Elementary Italian.—Grandgent's *Italian Grammar*. A continuous course open to all.

3 units, both semesters (SMITH) MWF 8:15

15a. Elementary Portuguese.

3 units, both semesters (——) MWF 9:15

16. Dante and the Divine Comedy.—Lectures, with assigned readings. Open to juniors and seniors in all departments.

2 units, 2d semester (JOHNSTON) [Not given in 1916-17.]

[Course 16 alternates with course 25.]

COURSES FOR UNDERGRADUATES AND GRADUATES

17. Outline Course in the History of French Literature.—A course based on the *Histoire Illustrée de la littérature française* by Abry, Andic, and Crouzet. The text will be studied outside of class and periodic tests will be given upon it. There will be occasional supplementary lectures. Most of the work done in class will consist of the

reading and interpretation of representative works of some of the best authors of each period. Some outside reading will also be assigned. Prerequisites: courses 2 and 3, or course 5, or their equivalents.

3 units, both semesters (SMITH) [Not given in 1916-17.]

18. Realism in the Modern French Drama.—Lectures in English on the realistic movement in the French drama since 1850. Extensive reading outside of class and discussion of plays of representative modern authors. Prerequisite: course 17 or 18 or an equivalent.

3 units, 1st semester (DE VRIES) MWF 8:15

19. The French Novel.—Lectures in English. Emphasis will be placed on the study of the realistic-naturalistic movement of the 19th century. Extensive reading outside of class and discussion of representative works. Prerequisites: courses 2 and 3 or 5.

3 units, 2d semester (DE VRIES) MWF 8:15

20. Literary Criticism.—Lectures in English on the history of literary criticism in France from the Renaissance to modern times. Emphasis is laid on the 19th century.

2 units, 2d semester (DE VRIES) [Not given in 1916-17.]

21. The Romantic Movement in France, Italy, and Spain.—(a) First semester: Neo-classicism in the Romance countries. Rousseau, Bernardin de St. Pierre, Chateaubriand, the Italian Romanticists. (b) Second semester: The French and the Spanish Romanticists. The course is intended for seniors and graduates having a good knowledge of one Romanic language. The lectures will be in French. Each student will be expected to read widely in either the French, the Spanish, or the Italian field.

2 units, both semesters (PELLISSIER) [Not given in 1916-17.]

22. Modern Spanish Novel.—A study of the modern Spanish novel and its relation to the development of the novel in France and other European countries. Lectures and collateral readings. Conducted in Spanish.

2 units, 1st semester (ALLEN) TTh 8:15

23. Modern Spanish Drama.—(a) A rapid survey of the development of the Spanish drama in the nineteenth century, with a study of the more important works of Rivas, Gutiérrez, Zorrilla, Bretón de los Herreros, Ayala, Echegaray. (b) A study of the significant works of the contemporary dramatists, especially Benavente, the Quintero brothers, Dicenta, Marquina and Martínez Sierra. Lectures and collateral readings. Conducted in Spanish.

3 units, 1st semester (ESPINOSA) [Not given in 1916-17.]

24. Outline Course in the History of Spanish Literature.—Lectures with reading of important works and reports by the members of the class. Open to students who have completed course 14 or its equivalent. Conducted in Spanish.

3 units, 2d semester (ALLEN) MWF 8:15

25. Advanced Italian.—Dante, *La Divina Commedia*. Translation course open to students who have completed course 15.

3 units, both semesters (JOHNSTON) MTTh 1:30

26. Teachers' Course in French.—Lectures on methods of teaching French, study of the available text-books, review of French grammar. Open only to advanced students.

2 units, 1st semester (JOHNSTON) [Not given in 1916-17.]

COURSES FOR GRADUATES

27. Origins of Spanish Drama.—A history of the drama from the earliest times to its full development with Lope de Vega. Lectures and collateral reading. Conducted in Spanish.

2 units, 2d semester (ALLEN) TTh 8:15

28. Introduction to the Study of Old Spanish.—Reading and interpretation of old Spanish texts. Lectures on old Spanish Phonology and Morphology, with linguistic exercises based on *El Cantar de mio Cid*. Ford, *Old Spanish Readings*, Biblioteca de Autores Españoles, vol. LVII.

3 units, 1st semester (ESPINOSA) MWF 10:15

29. Spanish Historical Grammar.—Lectures and study of Old Spanish texts. Hannsen, *Gramática Histórica Castellana*, Halle, 1913.

2 units, 1st semester (ESPINOSA) [Not given in 1916-17.]

30. Old Spanish Ballads.—History of Spanish epic poetry from the cantares de gesta to the romances. Lectures, readings, and investigations on special topics.

3 units, 2d semester (ESPINOSA) [Not given in 1916-17.]

31. Spanish Seminary, Lope de Vega.—Topics assigned to each student.

2 units, 1st semester (ALLEN) [Not given in 1916-17.]

32. Romance Versification.—The fundamental principles of Romance verse structure, with particular attention to French and Spanish. Lectures and practical exercises.

3 units, 2d semester (ESPINOSA) MWF 10:15

33. Introduction to the Study of Old French.—Reading of selected passages from Bartsch-Wiese, *Crestomathie de l'Ancien Français* (Leipzig, Vogel, 1908), with a study of Old French Phonology and Morphology.

3 units, 1st semester (JOHNSTON) MTTh 3:30

34. French Historical Grammar.—Lectures on Old French Phonology and Morphology.

2 units, 2d semester (JOHNSTON) [Not given in 1916-17.]

35. Old French Literature.—Lectures, with assigned readings.

2 units, both semesters (JOHNSTON) TTh 2:30

36. Introduction to the Study of Old Provençal.—Readings of selected passages from Appel's *Provenzalische Chrestomathie*, with a study of Old Provençal Phonology and Morphology.

3 units, 2d semester (JOHNSTON) [Not given in 1916-17.]

37. French Seminary.—In 1916-17 the Seminary will be devoted to the study of the *Romans d'Aventure*. Topics assigned to each student.

2 units, both semesters (JOHNSTON) W 1:30-3:30

38. Journal Club.—The instructors in the department and the advanced students meet regularly on alternate Fridays for the discussion of the periodicals and new books.

F 2-3

ENGLISH

WILLIAM HERBERT CARRUTH, RAYMOND MACDONALD ALDEN, JOHN S. P. TATLOCK, Professors.

LEE EMERSON BASSETT, HENRY DAVID GRAY, WILLIAM DINSMORE BRIGGS, Associate Professors.

SAMUEL SWAYZE SEWARD, JR., HOWARD JUDSON HALL, EVERETT WALLACE SMITH, †THERESA RUSSELL, Assistant Professors.

†EDITH RONALD MIRRIELES, †FRANK ERNEST HILL, ELISABETH LEE BUCKINGHAM, ARTHUR GARFIELD KENNEDY, ELIZABETH CHURCH, HARRIET BRADFORD (Dean of Women), MARGERY BAILEY, WILLIAM THOMAS HAM, KARL ELIAS LEIB, Instructors.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

a. The courses ordinarily prescribed in the major subject include Chaucer, Shakespeare, the advanced courses, 81, 82, 83, 84, in the His-

†Absent on leave, 1916-17.

tory of English Literature (four semesters) and an advanced course in a single author (as Milton, Wordsworth, or Spenser), besides such preliminary courses in composition, vocal expression, or literature as may be advised in individual cases. In the advanced courses in English Literature one of two substitutions may be made: (*a*) for the second semester's work in the earlier period, the course in Elizabethan Drama; or (*b*) for the first semester's work in the later period, the course in Modern English Fiction (68). (Students making English their major subject in preparation for journalism may substitute for two of the advanced courses in literature appropriate courses in some other subject, with the approval—to be obtained in advance—of their adviser.)

b. It is required also that each student pursue work in one foreign language and literature sufficiently for the accomplishment of two ends, (1) a practical reading knowledge of the language chosen, and (2) some acquaintance with its most important literature. This requirement is not primarily a matter of formal credit-hours, but will ordinarily be found to demand a minimum of 16 units of college work in the chosen language, aside from elementary courses (two years in the high school or one in the university). Introductory courses in Latin and Greek, if pursued in the University, will be counted as college work. Students should be assured that their language studies are so planned as to accomplish the ends desired. (Those who make Latin or Greek their principal language are advised, in general, to include two years of work in a modern language among their elective studies; and those who have chosen a modern language are encouraged to include among their elections two years of work in Latin or Greek.)

c. A course in English History is also prescribed for those who have not had a separate course in the subject in the high school.

THE TEACHER'S RECOMMENDATION.—The High School Teacher's Certificate is granted by the State to students who have fulfilled the State requirements as set forth on pages 85-87 of the *Register*. Recommendation by the department is granted by vote to students whose work has been of high character. It should be distinctly understood that a mere passing grade does not entitle a candidate to the endorsement of the department. The undergraduate courses usually prescribed are Vocal Expression, Shakespeare, Chaucer, Versification, English Language, Teachers' English, a full year's course in English literary history, and a half-year course in a literary type. The graduate courses must comprise not less than four units of work for each semester of study.

ADVANCED DEGREES

The candidate for the Master's degree in English must have: (1) The equivalent of the requirements for the A. B. degree in English; (2) an elementary knowledge of Old English; and (3) a reading knowledge of two foreign languages (preferably one ancient and one modern).

The work for the degree must occupy at least one full year of graduate study in residence, the greater part in English, the remainder in related fields. The courses in English will be divided between literature and philology. The candidate must present a thesis prepared under the direction of a member of the department and demonstrating the candidate's power of concentrated, independent study. This thesis may be accepted in lieu of not more than six units of the work in course.

For the conditions of acquiring the Doctor's degree, see the Graduate Study Bulletin.

PRELIMINARY AND GENERAL COURSES

[In general, courses 1-15 are open to first-year students; courses 16-30 are open to second-year students.]

A. Elementary Composition.—A one-semester course required of all first-year undergraduates who do not pass the matriculation test in English.

1 unit, either semester (CHURCH, BRADFORD) TTh 8:15, 9:15, 10:15

[For each student in course A, except in case of those who meet the requirement within a short time, a fee of \$10 is charged.]

2. English Composition.—Practical work in narration and description, first semester; in exposition, second semester. Membership in this course being limited to 180, students will be accepted in order of registration up to 5 p.m., August 30th. English majors are expected to enroll in section I, Journalism students in section II (see schedule).

2 units, both semesters (CARRUTH, HALL, GRAY, BRIGGS, SMITH,
SEWARD, CHURCH, BAILEY)

4. Vocal Expression.—A study of the principles of expressive reading, and the vocal interpretation of masterpieces in prose and poetry, with supplementary work in voice development. Each student is expected to memorize and vocally interpret some 350 lines of Shakespeare during the semester. The course is open to a limited number of students in the order of their application. Application should be made before the first meeting of the class in the semester, and the instructor

tory of English Literature (four semesters) and an advanced course in a single author (as Milton, Wordsworth, or Spenser), besides such preliminary courses in composition, vocal expression, or literature as may be advised in individual cases. In the advanced courses in English Literature one of two substitutions may be made: (a) for the second semester's work in the earlier period, the course in Elizabethan Drama; or (b) for the first semester's work in the later period, the course in Modern English Fiction (68). (Students making English their major subject in preparation for journalism may substitute for two of the advanced courses in literature appropriate courses in some other subject, with the approval—to be obtained in advance—of their adviser.)

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c. A course in English History is also prescribed for those who have not had a separate course in the subject in the high school.

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The work for the degree must occupy at least one full year of graduate study in residence, the greater part in English, the remainder in related fields. The courses in English will be divided between literature and philology. The candidate must present a thesis prepared under the direction of a member of the department and demonstrating the candidate's power of concentrated, independent study. This thesis may be accepted in lieu of not more than six units of the work in course.

For the conditions of acquiring the Doctor's degree, see the Graduate Study Bulletin.

PRELIMINARY AND GENERAL COURSES

[In general, courses 1-15 are open to first-year students; courses 16-30 are open to second-year students.]

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1 unit, either semester (CHURCH, BRADFORD) TTh 8:15, 9:15, 10:15

[For each student in course A, except in case of those who meet the requirement within a short time, a fee of \$10 is charged.]

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2 units, both semesters (CARRUTH, HALL, GRAY, BRIGGS, SMITH, SEWARD, CHURCH, BAILEY)

4. Vocal Expression.—A study of the principles of expressive reading, and the vocal interpretation of masterpieces in prose and poetry, with supplementary work in voice development. Each student is expected to memorize and vocally interpret some 350 lines of Shakespeare during the semester. The course is open to a limited number of students in the order of their application. Application should be made before the first meeting of the class in the semester, and the instructor

tory of English Literature (four semesters) and an advanced course in a single author (as Milton, Wordsworth, or Spenser), besides such preliminary courses in composition, vocal expression, or literature as may be advised in individual cases. In the advanced courses in English Literature one of two substitutions may be made: (a) for the second semester's work in the earlier period, the course in Elizabethan Drama; or (b) for the first semester's work in the later period, the course in Modern English Fiction (68). (Students making English their major subject in preparation for journalism may substitute for two of the advanced courses in literature appropriate courses in some other subject, with the approval—to be obtained in advance—of their adviser.)

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1 unit, either semester (CHURCH, BRADFORD) TTh 8:15, 9:15, 10:15

[For each student in course A, except in case of those who meet the requirement within a short time, a fee of \$10 is charged.]

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2 units, both semesters (CARRUTH, HALL, GRAY, BRIGGS, SMITH, SEWARD, CHURCH, BAILEY)

4. Vocal Expression.—A study of the principles of expressive reading, and the vocal interpretation of masterpieces in prose and poetry, with supplementary work in voice development. Each student is expected to memorize and vocally interpret some 350 lines of Shakespeare during the semester. The course is open to a limited number of students in the order of their application. Application should be made before the first meeting of the class in the semester, and the instructor

reserves the right to refuse to enroll students who do not appear at the first session of the class. Three sections.

3 units, either semester (BUCKINGHAM) MWF 8:15, 9:15, 11:15

5. Reading Aloud.—Practice in the application of the fundamental principles of effective reading to varied types of literature. Prerequisite: course 4.

2 units, either semester (BUCKINGHAM) TTh 11:15

6. Practical Phonetics.—A course in the enunciation and pronunciation of the English language. Designed especially for foreign students.

1 unit, either semester (BASSETT) T 3:30

7. Extemporaneous Speaking.—Practice in extemporaneous speaking on subjects of current interest, with some attention to the preparation of speech outlines. Four sections.

2 units, 1st semester (BASSETT, LEIB)

I, MW 8:15; II, III, T 1:30-3:30; IV, Th 1:30-3:30

8. Outline History of English Literature.—A survey, critical and historical, of English literature in its larger aspects, with readings. Designed primarily for first-year English major students who have not taken a high school course in the subject.

3 units, 1st semester (CHURCH) MWF 10:15

9. American Literature.—General survey of the history of American literature, with reading of selected representative works. For first-year or second-year students. Not open to students having entrance credit in the subject.

3 units, 2d semester (HALL) MWF 10:15

10. English Classics.—A study of representative works of great English writers from Malory to Browning, with assigned reading and writing. Open only to first-year students who are not English majors.

3 units, either or both semesters (SEWARD) MWF 10:15

11. Introduction to Poetry.—A study of the nature, methods, and forms of poetry, with exercises in analysis and interpretation. Open to students of all departments.

3 units, 2d semester (ALDEN) MWF 11:15

13. Free Reading.—Intended to encourage familiarity with books and to supply an opportunity for more general reading. Open to a limited number of students from other departments. Six hours of reading weekly.

2 units, either semester (CARRUTH) By appointment

14. Tennyson.—A study of selected portions of Tennyson's poems, illustrating the growth of his literary art. A general course, designed for first- and second-year students, and open to third- and fourth-year students by permission only.

3 units, 1st semester (HALL) MWF 9:15

16. Advanced Composition.—Including both rapid writing and the preparation of long themes. Prerequisite: course 2.

3 units, both semesters (RUSSELL) MWF 9:15

17. News Writing.—Practice in abstracting and condensing, writing within time and space limits, copy-reading and headline writing; together with instruction in methods of gathering news, and in the duties of the various members of a newspaper staff. Prerequisite: course 2.

2 units, both semesters (SMITH) TTh 11:15

19. Vocal Interpretation.—*a.* An advanced course in the vocal interpretation of literature. Designed particularly for those who intend to teach English literature. Prerequisite: courses 4 and 5.

2 units, 1st semester (BASSETT) MW 1:30

b. Dramatic Literature (second semester). Scenes assigned from Shakespeare and from modern plays of literary merit. Members of the class will vocally interpret characters and scenes assigned for individual study. Prerequisite: course 19*a*.

2 units, 2d semester (BASSETT) MW 1:30

20. Practical Debate.—Under supervision of the department those students who make the practice squads for any intercollegiate debate may receive credit, upon satisfactory completion of the work.

1 or 2 units, either or both semesters (BASSETT, LEIB)

22. Victorian Prose.—A survey of Victorian prose, with special emphasis upon Carlyle, Ruskin, and Arnold.

2 units (SEWARD) [Not given in 1916-17.]

23. Victorian Poetry.—A study of selected Victorian poets.

2 units (SEWARD) [Not given in 1916-17.]

24. English Bible.—Representative portions of the Bible studied as literature, with some consideration of the history and the prose style of the English versions. Not open to first-year students.

3 units, 2d semester (GRAY) MWF 10:15

25. Shakespeare.—The first semester's work consists of a rapid reading of a considerable number of the plays in chronological sequence. The second semester is devoted to a careful study of three

or four plays. Open in the first semester to all second-year students; in the second semester to English majors and such others as show special interest and aptitude.

3 units, either or both semesters (GRAY, ALDEN) MWF 10:15

27. Browning.—Open only to students especially recommended.

2 units, 1st semester (HALL) TTh 9:15

ADVANCED AND SPECIAL COURSES

[Unless otherwise specified, the following courses are open to third-year and fourth-year students of all departments.]

31. Exposition.—An advanced course. Special attention will be given to students preparing theses or other papers. Prerequisite: course 2 or equivalent.

2 units, 2d semester (HALL) TTh 9:15

32. Argumentation.—The theory of argumentation, with practice in the preparation of briefs and forensics. Open to all students who have made a satisfactory grade in English 2.

2 units, both semesters (BRIGGS, LEIB) TTh 8:15

34. Play Construction.—The principles of dramatic writing developed in connection with the student's own work, together with the critical analysis of certain successful plays of the present.

2 units, both semesters (GRAY) W 2:30-4:30

35. Prosody and Verse Writing.—Study of lyric poems, with practical exercises in the same. Open also by permission to second-year students who have had four units in English composition.

2 units, 2d semester (CARRUTH) T 3:30-5:30

36. Short Story Writing.—Practice in the writing of short stories, and a study of the principles governing their composition.

3 units, both semesters (MIRRIELES) [Not given in 1916-17.]

36a. Conferences dealing with the construction of the short story. Open by permission to students who have completed English 36.

2 units, both semesters (MIRRIELES) [Not given in 1916-17.]

37. Essay Writing.—Preparation of magazine articles, criticisms, and papers of both informal and analytical character. Prerequisite: course 2.

2 or 3 units, both semesters (RUSSELL) [Not given in 1916-17.]

40. Editorial Writing.—A study of the purpose and power of the newspaper editorial.

1 unit, both semesters (SMITH) T 9:15

- 41. News Analysis.**—A systematic study of current news.
1 unit, both semesters (SMITH) Th 9:15
- 42. Correspondence.**—Instruction and practice in the work of the newspaper correspondent.
2 units, both semesters (SMITH) By appointment
- 43. American Journalism.**—A survey of the development of journalism, with a study of representative newspapers. (Course 17 a prerequisite).
3 units, both semesters (SMITH) MWF 11:15
- 44. Practical Reporting.**—Work on the staff of the *Stanford Palo Alto News*.
3 units, both semesters (SMITH) MW 1:30
- 45. Editorial Management.**—Practical work on the editorial staff of the *Stanford Palo Alto News*.
3 units, both semesters (SMITH) By appointment
- 50. Public Speaking.**—Practice in the preparation and delivery of speeches adapted to various audiences and occasions, with attention to the style of spoken discourse. Prerequisite, course 9. Two sections.
2 units, 2d semester (BASSETT) T 1:30; Th 1:30
- 51. Public Reading.**—A course in the preparation of poems, stories, and scenes from novels and plays for public presentation. Open to a limited number only.
2 units, both semesters (BASSETT) M 2:30-4:30
- 52. Oral Debate.**—Practice in the preparation and delivery of oral arguments, chiefly on current public questions. Open to a limited number of students who have had satisfactory experience in public speaking, to be admitted in the order of application.
2 units, both semesters (BASSETT, LEIB) W 2:30-4:30
- 55. Old English.**—Elements of Old English Grammar with reading exercises.
3 units, 1st semester (KENNEDY) MWF 8:15
- 56. English Language.**—An outline study of English in the light of its historical development.
2 units, 1st semester (SEWARD) TTh 8:15
- 58. Chaucer.**—This course is elementary and includes an outline of Middle English Grammar for the beginner. Open to third-year students who have a reading knowledge of one foreign language. For special outside work an extra credit will be given.
2 or 3 units, 1st semester (KENNEDY) Th 1:30-3:30

- 60. Spenser.**—Primarily for fourth-year students of the English department.
2 units, 2d semester (BRIGGS) [Not given in 1916-17.]
- 61. Milton.**
2 units, 2d semester (BRIGGS) TTh 11:15
- 62. Wordsworth.**
2 units, 1st semester (HALL) [Not given in 1916-17.]
- 65. Introduction to Comparative Literature.**—An exposition of the comparative method in literary study, with a survey of the distribution of types in world literature. Open to third-year and fourth-year students who have had not less than ten units in English literature.
2 units, 1st semester (CARRUTH) TTh 9:15
- 66. National Epics.**—Reading in translation of the Mahabharata, the Iliad, the Aeneid, the Beowulf, the Song of Roland, the Nibelungenlied, and the Kalewala. Open also to graduates.
3 units, 2d semester (CARRUTH) WF 8:15
- 67. The History of Prose Fiction.**—Including the beginnings of English fiction to DeFoe.
2 units, 2d semester (CARRUTH) WF 9:15
- 68. English Fiction.**—A course in the history of English fiction from DeFoe through the major novelists of the nineteenth century
3 units, 1st semester (BRIGGS) [Not given in 1916-17.]
- 69. The Modern Novel.**—The reading of one novel a week, supplemented by lectures covering additional works of the authors studied and some account of other important novelists of the time.
3 units, 1st semester (GRAY) TTh 10:15
- 70. The English Drama to 1642.**—The beginnings and development of the drama.
3 units, 1st semester (BRIGGS) [Not given in 1916-17.]
- 71. The Modern Drama.**—A study of certain significant dramas of Ibsen, and of contemporary dramatists.
3 units, 2d semester (GRAY) [Not given in 1916-17.]
- 72. Satire in English Literature.**—An analysis of humor and satire (with the emphasis on the latter) both as abstract qualities and as elements of literature. Historical survey and study of illustrative examples. Not open to first-year students.
3 units, 1st semester (RUSSELL) [Not given in 1916-17.]

80. Old English Literature to 1066.—Survey with lectures and reading in translation.

2 units, 2d semester (KENNEDY)

M 1:30-3:30

81. Medieval Literature, with Special Reference to Middle English.

—Primarily for fourth-year students of the English department. Special attention is paid to the literary relations of England and the Continent from the Anglo-Saxon period to the sixteenth century. The course will serve as a general introduction to medieval European literature, which is studied by types: romances, histories, visions, lyrics, fabliaux, etc. This course is continued in no. 88.

3 units, 1st semester (TATLOCK)

MWF 11:15

82. English Literature from 1557 to 1700, Exclusive of the Drama.

—Primarily for fourth-year students of the English department.

3 units, 2d semester (BRIGGS)

MWF 11:15

83. English Literature from 1700 to 1780.—Primarily for third-year students of the English department.

3 units, 1st semester (ALDEN)

MWF 11:15

84. English Literature from 1780 to 1832.—A continuation of course 83.

3 units, 2d semester (HALL)

MWF 11:15

85. English Literature of the Revolutionary Era.—A study of the writings connected with the French Revolution and related movements, with emphasis on ideas rather than literary form. (Not open to major students in English, except by permission; open to other students in the third and fourth years, and to second-year students on recommendation from first-year courses in literature.)

2 or 3 units, 1st semester (ALDEN)

MWF 9:15

[The following courses are open to graduates also.]

87. The Life and Thought of the 16th and 17th Centuries.—For seniors and graduates of all departments.

2 units, both semesters (BRIGGS)

By arrangement

88. Medieval Literature from the Old English Period to the Sixteenth Century.—A continuation of course 81.

3 units, 2d semester (TATLOCK)

MWF 11:15

90. American Poetry, Exclusive of the Drama.—A study of the greater American poets with especial reference to their relation to English and Continental literature. [In 1916-17 attention will be di-

rected especially toward the reception and standing of these poets in foreign countries.]

3 units, 1st semester (CARRUTH) WF 8:15

93. Beowulf.

3 units, 2d semester (KENNEDY) MWF 10:15

94. Middle English Readings.

2 units, 2d semester (KENNEDY) [Not given in 1916-17.]

96. Ballads.

2 units, 1st semester (BRIGGS) W 1:30

98. Teachers' Course in English.—A study of the methods of teaching Composition (first semester) and Literature (second semester) in secondary schools. Open to fourth-year students.

2 units, both semesters (SEWARD) W 1:30-3:30

99. Versification.—An introduction to the theory of rhythm and metre, the history of English prosody, and the problems of reading and teaching verse. Open to fourth-year students and graduates; to third-year students by special permission.

2 units, 2d semester (ALDEN) WF 8:15

GRADUATE COURSES

[Open also by consent of the instructor to advanced undergraduates.]

101. Introduction to Philology and Bibliography.

2 units, 2d semester (KENNEDY) Th 1:30-3:30

103. Tragedy.—A comparative study of the theory and practice of tragedy in various literatures.

2 to 4 units, both semesters (ALDEN) [Not given in 1916-17.]

104. Comedy.—An inquiry into the nature of the comic and into its literary uses, as exemplified especially in the drama.

2 units, both semesters (SEWARD) MW 11:15

105. The English Lyric.—A study of the several forms of English lyrical poetry, each in its historical development.

2 to 4 units, 2d semester (GRAY) [Not given in 1916-17.]

107. Tennyson.—The Idylls of the King compared with their sources.

2 to 4 units, 1st semester (CARRUTH) Th 1:30-3:30

108. The Hildebrand Theme in General Literature.—A study of the source and migration of epic themes.

2 units, 2d semester (CARRUTH) [Not given in 1916-17.]

110. Chaucer (advanced course).—Most of the *Canterbury Tales* will be studied, especially the parts less often read, with attention to the structure and history of the work and its literary significance. Prerequisite: course 58 or its equivalent. Open to fourth-year students and graduates of other departments. For special outside work an extra credit will be given.

2 or 3 units, 1st semester (TATLOCK) By arrangement

111. Shakespeare.—An introduction to the bibliography of the subject, the history of the text, and methods of critical study.

2 to 4 units, 1st semester (ALDEN) T 2:30-4:30

112. Shakespeare.—A critical study of one or more plays.

2 to 4 units, 2d semester (GRAY) T 2:30-4:30

113. Marlowe.

2 to 4 units, 1st semester (BRIGGS) [Not given in 1916-17.]

114. Jonson.

2 to 4 units, both semesters (BRIGGS) M 3:30-5:30

117. Journal Club: Literary Section.—Reports on current literature by the members of the course.

1 unit, both semesters (CARRUTH) Th 3:30

118. Early English Seminary.—Papers and Lectures. The subject for 1916-17 will be the story of the siege of Troy in medieval and modern literature, with special reference to Chaucer and Shakespeare.

2 units, 2d semester (TATLOCK) By arrangement

JOURNALISM

The following curriculum is outlined for the guidance of students intending to enter journalism. It is based on the conviction that the best preparation for the journalistic career is the broadest possible college course with a preponderance of English, History, and Economics. The intending journalist will make one of these his major department, in accordance with his inclinations and with the advice of the instructor in journalism and the head of the department. He will be subject to the direction of the major department in conjunction with the instructor in journalism. He will be classified and his diploma marked, if so desired, "English (Economics, History) preparatory to Journalism." Intending journalists are encouraged to compete for opportunities to engage in college journalism and thus to obtain all possible practical experience during their course. When done systematically and under the direction of the instructor in journalism provision is made for a just amount of credit for such work.

DISTRIBUTION OF WORK

(a) English (15), Economics (15), History (15), Journalism (15); total, 60 units.

(b) Selection from at least five of the following divisions: Biology, Physical Science, Geology, Astronomy, Physiology and Hygiene, Philosophy and Psychology, Sanitary Engineering, Law, Medical Theory, Education; total, 30 units.

(c) Margin to complete requirements of major department, and for free choice, 30 units.

[A tentative working schedule of a four-years' curriculum in accordance with this outline will be furnished on application.]

COMPARATIVE LITERATURE

The following courses offered by the various departments of literature in the University pursue the comparative method and contribute to a survey of the literature of the world and the relations of the several literatures to one another. English majors are advised to elect as many as possible of these courses. Detailed description and the conditions of election are given under the respective departmental announcements.

INTRODUCTION TO COMPARATIVE LITERATURE. [English 65.]

THE ENGLISH BIBLE. [English 24.]

GREEK LITERATURE. [Greek 22.]

LATIN LITERATURE. [Latin 32.]

EARLY ENGLISH AND GENERAL MEDIEVAL LITERATURE. [English 81.]

HISTORY OF GERMAN LITERATURE. [German 13.]

THE REVOLUTIONARY ERA. [English 85.]

THE 18TH CENTURY. [English 83 and 84.]

THE VICTORIAN ERA. [English 22 and 23.]

NATIONAL EPICS. [English 66.]

THE GREEK EPIC. [Greek 19.]

THE HILDEBRAND THEME. [English 108.]

DANTE AND THE DIVINE COMEDY. [Romanic Languages 16, 25.]

CHAUCER. [English 58 and 95.]

TENNYSON: THE SOURCES OF THE IDYLLS OF THE KING. [English 107.]

THE HISTORY OF PROSE FICTION. [English 67.]

ENGLISH FICTION. [English 68.]

THE MODERN NOVEL. [English 69.]

MODERN GERMAN NOVELS. [German 5.]

THE FRENCH NOVEL IN THE 19TH CENTURY. [Romanic Languages 19.]

- THE DEVELOPMENT OF TRAGEDY. [English 103.]
 COMEDY. [English 104.]
 GREEK TRAGEDY. [Greek 20.]
 ROMAN COMEDY. [Latin 8.]
 THE ENGLISH DRAMA TO 1642. [English 70.]
 THE MODERN DRAMA. [English 71.]
 ORIGINS OF THE SPANISH THEATER. [Romanic Languages 27.]
 THE FRENCH DRAMA IN THE 19TH CENTURY. [Romanic Languages 19.]
 BALLADS. [English 96.]
 THE ENGLISH LYRIC. [English 105.]
 LATIN SEMINARY: LYRIC POETRY. [Latin 22.]
 GREEK SCULPTURE. [Greek 21.]
 ROMAN ART AND ARCHAEOLOGY. [Latin 31.]
 HISTORY OF GERMAN CIVILIZATION. [German 21.]
 THE CLASSICAL INFLUENCE IN ENGLISH LITERATURE. [Latin 33.]
 AMERICAN POETRY IN RELATION TO EUROPEAN. [English 90.]

BIBLICAL HISTORY AND LITERATURE

DAVID CHARLES GARDNER, Chaplain, Lecturer.

AUGUSTUS TABER MURRAY (Department of Greek), THERESA PEET RUSSELL (Department of English Literature).

1. **Life and Teaching of Christ.**—A history of the life and times of Jesus, with a study of the four Gospels, an analysis of the Ethics of Jesus, and the application of his teaching to the life of to-day. Lectures, discussions, and papers.

1 unit, both semesters (GARDNER) Th 1:30

English Bible.—Representative portions of the Bible studied as literature, with some consideration of the history and the prose style of the English versions. Not open to first-year students. [English 16.]

3 units, 2d semester (RUSSELL) MWF 10:15

New Testament Literature.—A critical introduction to the literature of the New Testament for general students; no knowledge of Greek is presupposed. Lectures with assigned readings. [Greek 23.]

2 units, 1st semester (MURRAY) TTh 11:15

Greek Testament.—A study of the book of Acts in the Greek, with passages from the letters of Paul. [Greek 12]

2 units, 2d semester (MURRAY) TTh 11:15

PHILOSOPHY

HENRY WALDGRAVE STUART, Professor.

HAROLD CHAPMAN BROWN, Assistant Professor.

[Courses 1 and 7 only are open to first-year students; courses 1 to 5 inclusive presuppose no previous work in the department.]

1. Elementary Logic.—The principles of Deductive and Inductive Logic, with special attention to the important types of fallacy.

3 units, 1st semester (STUART, BROWN) MWF 9:15

2. Elementary Ethics.—A short survey of the main characteristics of primitive as compared with more developed forms of morality. The important historic theories as to the criterion for good conduct. The working principles of good conduct.

3 units, 1st semester (STUART) MWF 10:15

3. History of Philosophy.—The development of philosophical theories from the early Greek period to the end of the eighteenth century in Germany, with a brief outline of philosophical movements in the nineteenth century. Attention will be given throughout to the relations of philosophy with social and political conditions and with science, literature, and religion.

3 units, both semesters (BROWN) MWF 8:15

4. Modern Scientific Conceptions of Nature and Mind.—A study of current views of cosmic structure and the place of man and his activities in nature, in the light of recent developments in physical chemistry, evolutionary biology, and psychology.

3 units, 2d semester (BROWN) MWF 11:15

5. Esthetics.—The origins and nature of art. Its significance for religion, morality, and social life. The rise of art forms. Contemporary theories of esthetics.

3 units, 2d semester (BROWN) [Not given in 1916-17.]

6. Philosophy of the Nineteenth Century.—The development of philosophical problems in France, Germany, and England will be studied in successive years in relation to the particular national genius and the conditions under which they arose. The topic for 1916-17 will be French philosophy since the revolution. Prerequisite: course 3, or special permission of the instructor for suitably qualified third- or fourth-year students.

2 units, 2d semester (BROWN) TTh 10:15

7. Advanced Logic.—Methods of investigation in use in the natural and social sciences, and the cardinal assumptions and principles

on which these methods are based. Prerequisite: course 1 or an equivalent.

3 units, 2d semester (STUART) MWF 9:15

8. The Social Order and the Individual.—Insect and animal “societies” and the types of human social organization. Social authority and individual initiative. The political obligations of the individual and the ethical basis of political institutions and of law. Democracy, aristocracy, and absolutism. A continuation of course 2; open on approval to students otherwise qualified.

3 units, 2d semester (STUART) MWF 10:15

9. Religion.—The psychological and social origins of religion. The relations of religion to science, to morality, and to philosophy. The distinctive content and characteristics of the great religions. Prerequisite: course 2, 3, or 4, or an equivalent.

3 units, 1st semester (STUART) TTh 10:15

10. Outlines of General Philosophy.

2 or 3 units, both semesters (STUART) [Not given in 1916-17.]

11. Seminary.—(a) *Theories of Consciousness.* William McDougall’s “Body and Mind” will be used as a basis for the study of contemporary thought on the nature and significance of consciousness.

1st semester (BROWN) By arrangement

(b) *Contemporary Realism.* “The New Realism” (Macmillan, 1912) and certain writings of Bertrand Russell will be the principal material for a study of the logical and ethical tendencies of this movement. A continuation of the above.

2d semester (STUART) By arrangement

PSYCHOLOGY

FRANK ANGELL, Professor.

JOHN EDGAR COOVER, Assistant Professor and Research Fellow in Psychic Phenomena.

JOSEPH EDGAR DE CAMP, Instructor.

1. General Psychology.—Lectures and exercises. Open to first-year students by permission. Titchener’s Text-book of Psychology is used as a book of reference.

4 units, 1st semester (ANGELL) MTWTh 11:15

2. Laboratory Psychology.—Students are recommended to take this course in connection with courses 1 and 2.

3 units, either or both semesters (ANGELL, DE CAMP) TTh 1:30

2a. Laboratory Psychology.—In connection with Psychology 1 or its equivalent.

3 units, 1st semester (ANGELL) MWF 1:30

2b. Laboratory Psychology.

2 units, 1st semester (ANGELL) TTh 11:30

3. Advanced Laboratory Work.

3 units, both semesters (ANGELL, DE CAMP) MWF 1:30

4. Space Perception.—Usually presupposes or accompanies course 5.

3 units, 2d semester (ANGELL)

5. Statistical Methods.

2 units, 1st semester (COOVER)

6. History of Psychical Research.

2 units, 2d semester (COOVER)

7. Psychical Research Laboratory.

2 units, 2d semester (COOVER) TTh 1:30-4:30 by arrangement

8. Mind and Body.—Course 1 prerequisite.

3 units, 2d semester (COOVER) MWF 10:15

9. Research Work.

(ANGELL, DE CAMP) By arrangement

EDUCATION

ELLWOOD PATTERSON CUBBERLEY, LEWIS MADISON TERMAN, Professors.

PERCY ERWIN DAVIDSON, †RUFUS CLARENCE BENTLEY, Associate Professors.

JESSE BRUNDAGE SEARS, Assistant Professor.

MORRIS ELMER DAILEY, GEORGE ARCHIBALD CLARK, Lecturers.

——, Research Fellow on the Buckel Foundation.

——, ———, Assistants.

GRAPHIC ART

ARTHUR BRIDGMAN CLARK, Professor.

CHLOE LESLEY STARKS, Instructor.

†Absent on leave, 1916-17.

The Department of Education offers five main lines of work:

1. Courses of a general nature on the history, function, and administration of public education, intended in part as information courses for the general university student and without reference to the work of teaching. To such students the courses of Groups I and II are recommended.

2. Courses intended to assist other departments in preparing their students for work in secondary schools. All such students should confer with members of the Department of Education as to courses, but in general courses 1, 2, 20, and 24 are recommended, if the candidate has not had experience in teaching. Three units of work in courses relating to secondary-school work are required under the regulations of the California State Board of Education for the high school teacher's recommendation, as are courses 25 and 26, if the candidate has not had previous experience in teaching. (For a more detailed statement, see *Register*, pp. 85-88.)

3. Courses primarily for major students, or those making Education a minor, and intended to give special preparation to (a) those who desire to become teachers of Education in normal schools or colleges, (b) those who wish to prepare for supervisory or administrative positions in the public schools, elementary or secondary, and (c) those who wish to prepare for special educational work in the elementary or secondary field.

4. Courses and research work in the psychology and pedagogy of exceptional children. Two lines of work are offered in this field: (a) elementary courses designed to give prospective superintendents and principals a general acquaintance with the problems of special education, and (b) research courses for the advanced student who looks forward to work as clinical psychologist in the public schools or in institutions for defectives or delinquents. The Dr. C. Annette Buckel Foundation, supplemented by additional support from the Board of Trustees of the University, has provided for a "research fellowship in the psychology and pedagogy of backward children."

5. Courses for the preparation of teachers of drawing for the public schools, and for the general training of college students in artistic perception and graphic expression. (See division of Graphic Art.)

The courses in Education are open to all students as electives or as minor subjects, but only those who desire to prepare for one of the lines of work mentioned above under (3) or (4), and whose preparation and experience are satisfactory to the Department, will be accepted as

major students. In special cases those without teaching experience may be accepted as major students, but all such must register for courses 25 and 26 as soon thereafter as arrangements can be made.

MAJOR REQUIREMENTS

Major students begin their work in Education with the sophomore year, taking courses 1 and 2. Psychology 1 and 2a should also be taken this same year. Physiology 1, Zoology 1, or Botany 1, the course in Bionomics, and Economics 1, should also be taken early in the student's course. Other collateral work will be advised to meet individual needs. For graduation in Education students will be expected to have completed 30 units in the Department, including practice in teaching. This should ordinarily include courses 1, 2, 3 or 4, 11, 12 or 14, one advanced course listed under Group IV, and sufficient other courses listed under Groups I, II, or III to make up the required units. For students in the division of Graphic Art, 15 units of work in Education will be required. Students coming with advanced or graduate standing from other universities, where the curriculum does not parallel that offered here, may have substantially equivalent preparation or experience accepted in lieu of the courses required here.

The requirements for the baccalaureate degree cover only introductions to the different fields of Education, and it is assumed that those proposing to offer themselves for responsible positions in educational work, such as those indicated under 3, above, will proceed at once to the Master's degree. For this at least twenty units in advance of the baccalaureate requirements, together with the presentation of a satisfactory thesis, will be required. Work in Group I will not be included, and ordinarily one-half of the twenty units must be work listed under Group IV. The completion of the first year of graduate study should mean a somewhat general acquaintance with the different divisions of Education, together with the beginnings of specialization in some one of these. Those who desire to prepare for the type of positions indicated under 4, should proceed to the doctorate.

During the second year of graduate study the student will be expected to attain a mastery of the literature and practice in two of the following divisions of the subject: (1) History of Education, (2) Theory of Education, (3) Administration of Education, (4) Educational Psychology, (5) Educational Hygiene. Students intending to proceed to the doctorate, either at once or later, should select one of these divisions as a major and one as a minor; complete in large

part the required work in a second minor, outside of the Department; pass off the modern language requirements; and get well started on the dissertation.

LIBRARY AND PRACTICAL FACILITIES

The general university library contains the important recent books, and files of the more important educational magazines, both American and foreign. The collection of early American educational magazines and reports is also good. The special library of the Department, consisting of about 7500 volumes, contains one of the most complete collections of American state and city school reports to be found in the United States, the library ranking third in this respect. It is also rich in old college and normal school catalogues and text-books, of much historical value. The collection of old and present-day school text-books is also large and valuable.

In practical facilities the department has good working connections with the State Normal School at San Jose, and with the public schools of the immediate vicinity. For more important studies by advanced students the large school systems in the vicinity of the University can be used, and a kindergarten class and a class of retarded pupils are available for careful systematic instruction and study.

The department is also provided with a research laboratory for use in connection with the Buckel Foundation. This is well equipped with the apparatus, blanks, and other materials used in mental and physical tests.

I. ELEMENTARY AND INTRODUCTORY COURSES

[Open to any one with teaching experience, and to all others except first-year students.]

1. **Public Education in America.**—A study of the development, province, and some of the more important problems of public education in the United States. An introductory course. Lectures, following a syllabus, with assigned readings.

2 units, 1st semester (CUBBERLEY)

TTh 10:15

2. **Educational Theory.**—An introductory course dealing with topics fundamental to education, such as biological infancy, human endowment and culture, education and the social order, individual differences, types of learning, the order of growth, character, etc. Lectures, following a syllabus, with assigned readings.

2 units, 2d semester (DAVIDSON)

TTh 10:15

3. History of Education in Europe.—A study of the development of educational ideals and systems from the time of the Greeks to the present. Following a rapid survey of the Greek, Roman, and mediæval periods, the main emphasis will be placed upon educational developments subsequent to the Reformation and Renaissance movements.

3 units, 1st semester (SEARS)

MWF 9:15

3. History of Education in America.—A history of American educational ideals and practices, with some emphasis upon our European antecedents and those features which are peculiarly American.

3 units, 2d semester (SEARS)

MWF 9:15

5. Primary Education.—A study of the history and institutions of the formal education of young children; provisions in other countries; the kindergarten in America; the reforms of Montessori and others; pedagogy of the primary-school period.

3 units, 1st semester (DAVIDSON)

[Not given in 1916-17.]

II. MORE ADVANCED COURSES, BUT OF A SOMEWHAT GENERAL NATURE

[Open to teachers, and to third- and fourth-year students. In general, courses 1 and 2 should precede these courses. Course 3 should precede or accompany course 31.]

11. Educational Hygiene.—The hygiene of growth; physical defects of school children; the medical inspection and health supervision of schools; the hygiene of the school plant.

2 units, 1st semester (TERMAN)

TTh 11:15

12. Social and Moral Education.—A study of the significance for education of the psychology of character.

3 units, 1st semester (DAVIDSON)

MWF 10:15

14. Logic of Education.—A study of the significance for education of the psychology of attention, interest, and thinking. Prerequisite: General Psychology.

3 units, 2d semester (DAVIDSON)

MWF 10:15

15a. Elementary Education.—This course will deal with the larger problems of organization and management, including such topics as grade, departmental, and individual systems of class organization; schemes of promotion; program making; time allotment; grades and marks; records and reports; attendance; supervision; and kindred topics. For prospective principals and teachers in the elementary school.

2 units, 1st semester (SEARS)

TTh 9:15

15b. The Elementary School Curriculum.—A study of the principles underlying organization of subject matter for courses in the elementary school, including a critical examination of curricula syllabi, and school texts in the light of their function in teaching.

2 units, 2d semester (SEARS) TTh 9:15

19. Exceptional Children.—A somewhat general course dealing with the frequency, causes, and consequences of mental deficiency, and with the social and educational treatment of defective, delinquent, or otherwise exceptional children. Prerequisite: General Psychology.

2 units, 1st semester (TERMAN, ———) S 10:15-12:15

III. COURSES INTENDED PRIMARILY FOR THOSE PREPARING TO TEACH IN SECONDARY SCHOOLS

[Open to juniors, seniors, and graduate students. Course 25 should precede course 26 by one semester.]

20. Secondary Education.—A consideration of the aims, purposes, and problems of secondary education and a consideration of the high school as a community social and vocational institution. Open to seniors and graduate students.

3 units, 1st semester (CUBBERLEY) MWF 9:15

22. Problems in Secondary Education.—Practical problems of the secondary school, such as organization, community relationships, nature and scope, curricula, vocational adaptations and additions, foreign and American secondary schools compared. Open to those who have had course 20 or experience in teaching.

3 units, 2d semester (CUBBERLEY) MWF 9:15

24. Adolescence.—A study of the high school pupil with special reference to the needs of students who expect to teach in secondary schools.

2 units, 2d semester (TERMAN) TTh 11:15

25. Method and Management of Instruction.—A practical course in class-room management and the theory of instruction. Intended as a preparatory course for those expecting to do practice teaching, and should be taken the semester preceding.

1 unit, either semester (SEARS) M 1:30

26. Practice in Teaching.—Practice in the handling of classes and the giving of instruction, with accompanying conferences, as required by the rules of the State Board of Education for a California High School Teacher's Certificate. This may be arranged for at the University, at the San Jose State Normal School, or at any other Cali-

ifornia State Normal School. Hours for teaching must be arranged in advance: (a) if at the University, with Professor CUBBERLEY; (b) if at the San Jose State Normal School, with President DAILEY. Conference with all practice teachers.

4 units, either semester (——, DAILEY) M 4:30-5:30

IV. ADVANCED AND SPECIAL COURSES

[Intended primarily for teachers of some experience, and for students making Education a major or a minor. Open to such, of junior standing or above.]

28. Educational Theory, Advanced Course.—A consideration of certain of the wider bearings of public education. Topic for the semester: Education and modern social problems. Open to third- and fourth-year students after consultation.

3 units, 1st semester (DAVIDSON) MWF 11:15

29. Educational Problems.—A discussion club. Open on invitation.

1 unit, each semester (CUBBERLEY, Terman) Alt. W 7:30-9:30

30. Educational Psychology.—Original endowment; general mental growth; development of the special mental functions; individual differences in relation to heredity, sex, and environment; the psychology of learning; formal discipline; work and fatigue. Prerequisites: General and Experimental Psychology or their equivalents.

3 units, both semesters (Terman) MWF 11:15

31. Sources for the History of Education.—A more extensive and intensive study of the sources for the History of Education than is undertaken in connection with courses 3 or 4. Systematic readings, intended primarily to prepare for the teaching of the subject.

2 units, 2d semester (CUBBERLEY) [Not given in 1916-17.]

32. State School Administration.—A study of the educational principles underlying the proper administration of school systems in states and counties, and involving a comparative study of the school laws and school systems of the various American states. The course includes a study of such topics as federal and state policy, forms of control, revenue and its apportionment, the state and the teacher, the state and the child, private and sectarian education, and state oversight and control.

3 units, 1st semester (CUBBERLEY) MWF 10:15

33. City School Administration.—A study of the educational, financial, and administrative principles underlying the proper administration of school systems in cities, with a view to the establishment of prin-

ciples of action. A thesis on some problem in city school organization or administration required the first semester, and a survey of a city school system required the second semester.

3 units, 2d semester (CUBBERLEY) MWF 10:15

34. School Administration Practice.—A laboratory course in school administration practice, dealing with the office and supervisory work of principals of elementary schools and superintendents of schools. Visits will be made to school systems in the vicinity of the University.

2 units, 2d semester (CUBBERLEY) [Not given in 1916-17.]

35. Rural Education.—A course dealing with the social and economic factors in the development of rural institutional life; how these explain the present status of the larger administrative and supervisory problems of rural education; and the principles and practical methods essential to their solution. As a part of the work of this course each student will be expected to complete an educational survey of an assigned county, or rural section. Open to advanced students in educational administration.

2 units, both semesters (SEARS) T 2:30-4:30

36. Foreign School Systems.—A comparative study of the more important foreign state school systems, their policy of organization, ideals of work, methods of instruction, training of teachers, courses of study, statistics, and recent reforms. Different national systems will be studied each year.

2 units, both semesters (——) [Not given in 1916-17.]

37. Criticism and Supervision of Instruction.—A few advanced students, who have had sufficient teaching experience, will be allowed to undertake the personal investigation, in the schools of the vicinity, of problems in instruction or supervision. Collateral reading and detailed written reports will be required. Enrollment only after conference with the instructor concerned.

1 unit, either semester (DAVIDSON, SEARS)

38. Experimental Pedagogy.—The work of the first semester will consist of a systematic introduction to the use of educational statistics following a text. The second semester will be devoted to a survey of the investigations bearing upon the pedagogy of the elementary school subjects. Prerequisite: Elementary education (or teaching experience), and General and Experimental Psychology or their equivalents.

3 units, both semesters (DAVIDSON, OTIS) TTh 3:30-5:00

39. Intelligence Tests and the Psychology of Endowment.—The first semester will be devoted to a critical survey of the literature of

mental tests, with special reference to the psychological principles of measuring intelligence. During the second semester practice will be given in mental testing and the treatment of data. Prerequisite: General and Experimental Psychology, and Education 30 or its equivalent.

3 units, both semesters (TERMAN) TTh 1:30

40. Thesis Work.—In certain courses, students may be given an additional hour of credit on presentation of a satisfactory thesis on an assigned topic embodying the results of independent work. The consent of the instructor is necessary before registering.

1 unit, either semester

41. Special Courses.—Special work in independent investigations may be provided for students prepared to do advanced work, the nature of the investigation being determined by the student's preparation and needs. Candidates for advanced degrees will ordinarily register their thesis under this course, the number of units of credit being subject to individual arrangement. The members of the instructing staff stand ready to supervise independent investigations in the following fields:

(a) History and organization of American Education, and problems in state and city school administration. (CUBBERLEY)

(b) Problems in educational theory and elementary instruction. (DAVIDSON)

(c) Problems in rural education. (SEARS)

(d) Problems in the organization and administration of secondary education. (CUBBERLEY)

(e) Problems in mental development, educational psychology, and school hygiene. (TERMAN)

V. COURSES FOR TEACHERS OF SPECIAL SUBJECTS

The following special courses of instruction, and groupings of courses, designed to prepare teachers for special work in the public schools, are open as electives to majors in other departments, or may be taken in conjunction with a major in Education.

1. *Commercial Teachers' Training Course*

A. Commercial Teachers' Training Course.—A demonstration course in the teaching of shorthand and typewriting, supplemented by discussions and illustrations in the treatment of English, geography, arithmetic, law, and other collateral subjects, the object being to demonstrate a working plan for handling commercial subjects in the high school. Open to junior and senior students intending to take up teach-

ing. One hour of instruction and two hours of practice, three times weekly.

3 units, both semesters (CLARK)

2. *Manual Arts Teachers' Course*

This curriculum is designed to prepare teachers of the manual arts for work in polytechnic high schools. The full curriculum requires a minimum of 28 units of work, or a minimum of 22 units if preparation in Foundry Work and Pattern Making is omitted. The courses marked with the asterisk are essentials.

*1. Woodworking.—[Mech. Eng. 5.] 2 or 3 units, either semester.

*2. Forge Work.—[Mech. Eng. 1a and 1b.] 3 units, either semester.

*3. Machine Shop Work.—[Mech. Eng. 7a and 7b.] 3 units, either semester. (Presupposes Forge Work.)

4. Foundry Work.—[Mech. Eng. 3a and 3b.] 3 units, either semester.

5. Pattern Shop Work.—[Mech. Eng. 6a and 6b.] 3 units, either semester. (Presupposes Woodworking and Foundry Work.)

*6. Freehand Drawing.—[Graphic Art.] 3 units, each semester.

*7. Linear Drawing and Lettering.—[Engineering 1b.] 1 unit, either semester.

8. Descriptive Geometry.—[Engineering 1b.] 1 unit, 1st semester. (Presupposes Algebra, Geometry, and Linear Drawing and Lettering.) 4 units, 2d semester.

*9. Elementary Machine Drawing.—[Mechanical Eng. 11.] 2 or 3 units, either semester. (Presupposes Freehand Drawing, Linear Drawing and Lettering, and Descriptive Geometry.)

This course will take a part of a student's time for two years to complete. If begun in the senior year it can be completed at the same time the Teacher's Recommendation is ordinarily obtained. The best arrangement of the work will be as follows:

COURSES	1st Sem.	2d Sem.	3d Sem.	4th Sem.
*Woodworking	2-3	..	..	..
*Linear Drawing and Lettering	1	..	..	..
Descriptive Geometry	1	4	..	..
Foundry Work	3	..	..	..
Pattern Shop Work .....	..	3	..	..
*Freehand Drawing .....	..	..	3	3
*Forge Work .....	..	..	3	..
*Machine Shop Work .....	..	..	..	3
*Machine Drawing .....	..	..	..	2-3
Minimum units	7	7	6	8

VI. COURSES IN OTHER DEPARTMENTS

The following Teachers' Courses in other departments are designed for students preparing to teach these special subjects in secondary schools. Such courses are usually necessary for the departmental recommendation, and may be counted to the extent of three units as part of the work required in Education for a Teacher's Certificate.

- a. TEACHER'S COURSE IN GREEK.—[See Department of Greek.]
- b. TEACHER'S COURSE IN LATIN.—[See Department of Latin.]
- c. TEACHER'S COURSE IN GERMAN.—[See Department of Germanic Languages.]
- d. TEACHER'S COURSE IN FRENCH.—[See Department of Romanic Languages.]
- e. TEACHER'S COURSE IN ENGLISH.—[See Department of English.]
- f. TEACHER'S COURSE IN HISTORY.—[See Department of History.]
- g. TEACHER'S COURSE IN DRAWING.—[See division of Graphic Art.]
- h. TEACHER'S COURSE IN ELEMENTARY PHYSICS.—[See Department of Physics.]

VII. COURSES IN SANTA BARBARA AND SAN JOSE STATE NORMAL SCHOOLS

Major students in Education who desire to become teachers of Home Economics and Manual Arts may arrange to take these subjects during their junior year at the Santa Barbara State Normal School. There is a special section for university students having junior standing who arrange to spend the junior year in residence in the Santa Barbara State Normal School and return to the University for the senior year. These students later return to Santa Barbara for the full recommendation for the special secondary certificate. Another section is maintained for the university graduate who, qualifying for the general and special secondary certificate, can complete the requirements in seventy consecutive weeks. The Sciences, Hygiene, Economics, Psychology, Education, etc., if included in the university course, will allow more hours in the State Normal for professional work and its application in practice teaching in the special subjects. The Household Economics is required, but students may elect Household Science and Household Arts, or either one, with Applied Arts—Pottery, Woodcarving, Metal Work, Weaving, etc. Further information may be obtained by writing to Miss EDNAH A. RICH, President, State Normal School, Santa Barbara, California.

A similar arrangement is possible with the San Jose State Normal School. For information regarding courses of study, etc., address President M. E. DAILEY, State Normal School, San Jose, California.

DIVISION OF GRAPHIC ART

The work aims primarily to prepare students for positions as teachers of drawing and art in secondary schools. Many of the courses are also suitable for the practical and general cultural needs of students in other departments.

Intending teachers of art should register with Education as their major subject. The art work of such students will be somewhat as follows:

FIRST YEAR.—First semester: Still-Life or Landscape, 3 units; Linear Drawing and Lettering (Engineering 1a), 1 unit.

Second semester: Organic Form, 3 units; Machine Drawing (Mechanical Engineering 11), 2 units.

SECOND YEAR.—First semester: Design, 3 units; Pottery, 2 units; Lectures on Painters, 2 units.

Second semester: Art in the House, 3 units; Metal Work, 2 units; Lectures on Painters, 2 units.

THIRD YEAR.—First semester: Scientific Drawing or Textiles, 2 units; Pottery or Tooled Leather, 2 units.

Second semester: Advanced Metal Work, 3 units; Perspective, 2 units.

FOURTH YEAR.—First semester: Advanced Design, 3 units. Seminar, 1 unit.

Second semester: Teachers' Course in Art, 3 units. Seminar, 1 unit.

Upon completing 120 hours for graduation, including the above and fifteen units in Education, the special certificate for teaching art will be granted by the State Board of Education. Students who remain at the University for a fifth year of study following the acquirement of the A. B. degree, may take a portion of the above art work during their fifth year.

1. Still-Life.—Fundamental principles, in blocking, proportion, and light and shade; materials: charcoal and colored crayon. Open to all students.

2 to 3 units, both semesters (STARKS) (1st sem.) WThF 1:30-4:30
(2d sem.) MTWThF 1:30-4:30

2. Landscape.—Working out-of-doors in pencil, charcoal, and colored crayon. Open to all students having had the equivalent of course 1.

3 units, 1st semester (STARKS) MTW 1:30-4:30

3. Organic Form.—Drawing shells, leaf sprays, animal forms, etc., with reference to discipline in accuracy, and the perception of decorative arrangement. Preparation for course 4. Open to all students.

2 to 3 units, 2d semester (STARKS) MTW 1:30-4:30

4. Design.—Exercises in the principles of space filling, borders, squares, surface patterns, etc. Intended to accompany applied design and execution of work in handicrafts, pottery, leather tooling, metal work, and textiles. Course 3 or its equivalent a prerequisite.

3 units, 1st semester (CLARK) MTW 1:30-4:30

5. Art in the House.—A study of taste, convenience, and economy in house designing and furnishing; types of exteriors, arrangement of grounds, plans, textiles and furniture, expense lists for different grades of income. (Given in even numbered years only.) Open to students who have had three units of technical work.

3 units, 2d semester (CLARK) MTW 1:30-4:30

6. Lectures on Painters.—First semester, Masters of the Renaissance from Giotto to Velasquez. Second semester, Painters of the nineteenth century and of the present time. Open to all students.

2 units, either or both semesters (CLARK) TTh 10:15

7. Handicrafts.—(a) *Pottery*, modeling, casting, glazing and firing faience. Open to students who have had three units of technical work in drawing or design.

2 to 3 units, 1st semester (CLARK) WThF 1:30-4:30

(b) *Metal Work*, making trays, bowls, book supports, etc., in sheet copper; jewelry in silver and semi-precious stones. Open to students who have three units of technical work in drawing or design.

2 to 3 units, 2d semester (CLARK) WThF 1:30-4:30

(c) *Tooled Leather*, mats, card cases, etc. This work may be substituted in part for work in pottery or metal work.

(d) *Textiles*. The use of textiles in the various hangings and other articles of interior furnishing. Stenciling, block printing, and embroidery. Open to students who have had three units of technical work in design.

2 units, 1st semester (STARKS) ThF 1:30-4:30

8. Scientific Perspective.—A series of problems involving the mathematical principles of perspective and shades and shadows, and the application of these principles in drawing actual buildings and other objects. (Given in odd numbered years only.)

2 to 3 units, 2d semester (CLARK) TTh 11:15

9. Science Drawing.—A course designed to assist students in scientific illustration. It includes the drawing of simple scientific subjects in pen outline, line and stipple shading, wash, line and wash. Pencil and pen landscape for Geology students. Especial attention is paid to the needs of individual students. Open to science students on advice.

2 units, either semester (STARKS) TTh 9:15-12:15

10. Teachers' Course.—For intending teachers and supervisors of art. Consisting of lectures upon methods and aims in school curricula and in the practical work of preparing courses of study. Open to advanced students. (Given in odd numbered years only.)

3 units, 2d semester (CLARK) TTh 9:15

11. Seminar.—Discussion of current literature and special topics in art education. Open to seniors only.

1 unit, both semesters (CLARK, STARKS) T 4:30

HISTORY

EPHRAIM DOUGLASS ADAMS, ARLEY BARTHLOW SHOW, EDWARD BENJAMIN KREHBIEL, PAYSON JACKSON TREAT, Professors.

HENRY LEWIN CANNON, Associate Professor.

EDGAR EUGENE ROBINSON, PERCY ALVIN MARTIN, Assistant Professors.
YAMATO ICHIHASHI, Instructor.

The Teacher's Recommendation.—To obtain a Teacher's Recommendation in History the applicant must have completed, in a manner acceptable to the Department, three of the courses, 3, 4 (or 11 or 12), 5, 6, and 7, one advanced course (throughout one year), and the Teachers' Course in History (History 16). History majors may substitute for any one of the preceding elementary courses (3 to 7 inclusive) a year of Ancient History as offered by the Departments of Greek and Latin.

JOURNALISM.—Students taking History as a major with the intention of preparing for journalism are referred to the heading "Journalism" on page 31.

INTRODUCTORY COURSES

1. Historical Training Course.—A practical course in the finding and handling of historical material. Required of, and limited to, first-year History majors.

1 unit, both semesters (MARTIN) T 8:15

[History of Greece.—See Greek 24 and 25.]

[History of Rome.—See Latin 30.]

[Studies in Roman History.—See Latin 29.]

3a. The Early Middle Ages, 395-1095.—A general course, open to all students.

3 units, 1st semester (SHOW) MWF 10:15

3b. The Later Middle Ages, 1095-1492.—A continuation of course

3a. Open to all students who have had course **3a** or a satisfactory equivalent.

3 units, 2d semester (SHOW) MWF 10:15

4a. English History to 1485.—General outline course, open to a limited number of first-year students. (See course 12.)

3 units, 1st semester (CANNON) MWF 8:15

4b. English History from 1485 to the present time.—A continuation of course **4a**.

3 units, 2d semester (CANNON) MWF 8:15

5a. Modern European History, 1500-1715.—A general outline course. Not open to first-year students.

2 units, 1st semester (KREHBIEL) TTh 9:15

5b. Modern European History since 1715.—A continuation of course **5a**.

2 units, 2d semester (KREHBIEL) TTh 9:15

6a. American History, 1607-1760.—A study of the English colonization of the Atlantic Seaboard and of the westward movement of colonists of the British Empire. An introductory course open to students of all departments.

3 units, 1st semester (ROBINSON) MWF 10:15

6b. American History, 1760-1815.—A study of the Revolution and the Constitution. Particular attention is paid to western migration, the development of frontier areas, and the influence of the West on national affairs. A continuation of **6a**.

3 units, 2d semester (ROBINSON) MWF 10:15

- 7a. United States History, 1815-1860.**—Open to students who have had one course in history.
2 units, 1st semester (ADAMS) TTh 2:30-3:30
- 7b. United States History, 1860-1915.**—A continuation of course 7a.
2 units, 2d semester (ADAMS) TTh 2:30-3:30
- 8a. History of Japan.**—A survey of, and an attempt to interpret, the history of ancient and mediaeval civilization of Japan. Not open to first-year students.
3 units, 1st semester (ICHIHASHI) MWF 9:15
- 8b. History of Japan.**—A critical examination of the more important phases of modern civilization of Japan (since 1600). Open to students who have had course 8a, and to others by special permission.
3 units, 2d semester (ICHIHASHI) MWF 9:15
- 9a. The Far East.**—An account of the relations between Western nations and the peoples of Eastern Asia. The history of the Portuguese, Dutch, and British possessions in the Far East. Not open to first-year students.
3 units, 1st semester (TREAT) MWF 11:15
- 9b. The Far East.**—China, Indo-China, Japan, the Philippines. Not open to first-year students.
3 units, 2d semester (TREAT) MWF 11:15
- 10a. History of Latin America.**—An outline course dealing with the colonial expansion of Spain and Portugal in America and with the political, social, and industrial development of the leading republics of Latin America. Not open to first-year students.
2 units, 1st semester (MARTIN) TTh 11:15
- 10b. History of Latin America.**—A continuation of course 10a.
2 units, 2d semester (MARTIN) TTh 11:15

INTERMEDIATE COURSES

- 11. English Constitutional History.**—The course attempts to explain the development and operation of the present English constitution as well as to give the background for American constitutional history. Not open to first-year students.
2 or 3 units, both semesters (CANNON) TTh 8:15
- 12. English Narrative History.**—An intensive course. Open to a limited number of other than first-year students.
4 units, both semesters (CANNON) TWThF 10:15

14a. Constitution of the Holy Roman Empire.—A critical study of select documents illustrative of German constitutional development from the twelfth to the eighteenth century; designed as an introduction to 14b. Open to juniors, seniors, and graduates.

2 units, 1st semester (SHOW) TTh 10:15

14b. Origins of the German Constitution.—A critical examination of the successive steps in the creation of the German imperial system, from the French Revolution (1790) to the adoption of the present Constitution (1871); based on direct study of the documents. Open to juniors, seniors, and graduates.

2 units, 2d semester (SHOW) TTh 10:15

15a. The French Revolution and Napoleon.—A lecture course. Supplemented by investigations and reports. Open to students who have had course 5b, or an equivalent.

3 units, 1st semester (KREHBIEL) MWF 9:15

15b. Europe Since 1815.—Political, social, and economic. With special reference to the formation of European alliances and alignments of the great Powers. Prerequisite: 5b or an equivalent.

3 units, 2d semester (KREHBIEL) MWF 9:15

16. Teachers' Course.—Lectures, recitations, and practice dealing with the problems of history teaching in elementary and secondary schools.

2 or 3 units, both semesters (SHOW) TTh 2:30

17a. The Westward Movement.—A survey of the expansion of the American people into the Mississippi Valley and the American occupation of California and the Pacific Northwest. Open to third- and fourth-year students who have a satisfactory knowledge of American History.

2 units, 1st semester (ROBINSON) TTh 10:15

17b. History of the Far West.—A study of the growth and development of the Trans-Mississippi Region; its political reorganization and its influence upon national and international affairs. Open to students who have taken 17a.

2 units, 2d semester (ROBINSON) TTh 10:15

18a. American and English Relations During the Civil War.—Use of British and American documentary material. Open to third-year students who have taken general courses in English and American history. The documents are selected by the instructor, and the course

is intended to furnish training in the interpretation of documentary material.

3 units, 1st semester (ADAMS) MWF 11:15

18b. American and English Relations, since 1815.—Search for and selection of material on some assigned topic in diplomacy, with especial reference to the use of the United States documents and the British parliamentary papers.

3 units, 2d semester (ADAMS) MWF 11:15

19a. History of Brazil.—A somewhat detailed study of the History of Brazil up to the present time including a comparison of Brazilian political institutions with those of Spanish America and the United States. Open to those who have taken History 10 and to others with permission of the instructor.

3 units, 1st semester (MARTIN) MWF 11:15

19b. History of Mexico and California.—A somewhat detailed study of the History of Mexico up to the present time and the History of California up to 1848. Open to those who have taken History 10 and to others with permission of the instructor.

3 units, 2d semester (MARTIN) MWF 11:15

20. International Relations.—A course of lectures upon nationalism, the political, economic and cultural relations of states, the evolutionary forces of civilization in their relation to nationalism, and the projects for reducing war and substituting peaceful means of settling the differences of nations. Not open to first- and second-year students.

2 units, 2d semester (KREHBIEL) TTh 10:15

21. Tropical Colonization in the Far East.—A study of the present methods of the English, Dutch, French, and American peoples in managing tropical dependencies in the Far East. Open to students who have taken courses 9a and 9b.

2 units, 1st semester (TREAT) W 2:30

22. History of Australasia.—An account of British colonization in Australia and New Zealand to the present time. Open to third-year students who have a satisfactory knowledge of English history.

2 units, 2d semester (TREAT) TTh 9:15

23. Governments of the Far East.—A study of the present governmental systems of China and Japan. Open to students who have taken course 9b.

2 units, 2d semester (TREAT) [Not given in 1916-17.]

24. History of California.—A study of available materials. Independent investigation. Open to students who have taken 17a.

2 units, 2d semester (ROBINSON) By appointment

ADVANCED COURSES

[Intended primarily for graduate students, but open to advanced undergraduates, with permission of their instructors.]

26. Seminary in Japanese History.—A study of the development of Japanese institutions, political, social, economic, and religious. Assignment of topic to each student and thesis required. Topic for 1916-17: Political Development of the Japanese.

2 units, both semesters (ICHIHASHI) By appointment

27. Mediaeval Institutions.—A practical study of select documents in the field of German constitutional history. Ability to read Latin and German is required.

2 units, both semesters (SHOW) By appointment

28. Seminary in the History of the West.—Subject for 1916-17: Political Parties in the West.

2 units, both semesters (ROBINSON) W 2:30

29. Seminary in English History.—Subject for 1916-17: Selected topics; chiefly those relating to present-day problems.

2 units, both semesters (CANNON) By appointment

30. Seminary in Latin American History.

2 units, both semesters (MARTIN) By appointment

31. American Diplomatic History since 1815.—Open to students who have had course 18, and to others by special permission. Thesis required.

3 units, both semesters (ADAMS) TTh 3:30

32. Seminary in Modern European History.—Subject: International Joint Action in the Nineteenth Century.

2 units, both semesters (KREHBIEL) W 2-4

33. Seminary in the History of American California.

2 units, both semesters (ROBINSON) [Not given in 1916-17.]

35. Seminary in American-European Relations in Nineteenth Century.—Assignment of topic to each student and thesis required.

2 units, both semesters (ADAMS) By appointment

36. Seminary in the History of the Far East.—Open to students who have had course 9b.

2 units, both semesters (TREAT) M 2:30

ECONOMICS

AND POLITICAL SCIENCE

MURRAY SHIPLEY WILDMAN, ALBERT CONSER WHITAKER, ALVIN SAUNDERS JOHNSON, Professors.

DONALD FREDERICK GRASS, STEPHEN IVAN MILLER, JR., VICTOR J. WEST, FREDERICK BENJAMIN GARVER, Assistant Professors.

WILFRED ELDRED, Instructor.

YAMATO ICHIHASHI, Lecturer.

MARGARET MULFORD LOTHROP, ALBERT JOHN HETTINGER, Assistants.

GRADUATION.—To obtain recommendation for the degree of Bachelor of Arts in Economics and Political Science a student is expected to secure credit for a minimum of 30 units in this department. Of these, 9 units should be listed as advanced courses.

In addition to the work in this department candidates are expected to secure credit for about 40 units of specified courses in other departments. These courses should be chosen in consultation with the department adviser, and completed during the first two years in so far as possible.

It is necessary that a student shall have completed his 120 university units with an average class standing of "C."

TEACHER'S RECOMMENDATION.—To obtain a teacher's recommendation in Economics or Political Science or both a student must have completed courses 1 and 2 or their equivalent, together with 10 units additional in this department.

JOURNALISM.—Students, majors in this department who desire to prepare for journalism are referred to page 31.

Course 1 (or 1b) is the only Economics course open to first-year students and is prerequisite to every other course except when otherwise specified in the description of the course. Likewise course 2 is the only course in Political Science open to first-year students and is prerequisite to all others in that subject. Both these courses are required of all candidates for graduation who have made this their major department.

ELEMENTARY AND GENERAL COURSES

1. **Elements of Economics.**—A general and introductory course. One lecture hour and two quiz hours each week. Majors of other

departments, when juniors or seniors, may register for two units credit, omitting the lecture if necessary.

3 units, both semesters (WILDMAN, MILLER, GARVER, ELDRED)

MWF 9:15

rb. Elements of Economics.—Covering the same ground as course 1 to accommodate students entering at mid-year. Not open for credit to those who have had credit in course 1.

5 units, 2d semester (WILDMAN)

MTWThF 11:15

2. Introduction to Political Science.—An introductory study of the origin and nature of the state, forms of government, theories of state functions, citizenship, and political parties. A general course open to all students. This course or its equivalent is prerequisite for all other political science courses, and is required for majors.

3 units, 1st semester (WEST)

MWF 8:15

3. Elementary Accounting.—Development of accounting; theory of debit and credit; bookkeeping forms and practice; preparation of balance sheets and their interpretation; application of theory and principle to simple systems of accounts; practical accounting problems. Should be taken by students expecting to enter courses 20, 33, and 55.

3 units, 1st semester (GRASS)

MWF 9:15

4. Money and Banking.—The elements of monetary theory; the laws of coinage, legal tender, and credit; the standard of value, price movements and their relation to prosperity; the banking systems of the United States and of California.

4 units, 1st semester (WILDMAN)

TWThF 9:15

5. Elements of Railway Transportation.—This course will cover the main problems of railways in the light of economic principles, and their wider significance to industry and society; the present American railway system and its development; railway finance, theories of rates, and methods of public control.

3 units, 1st semester (MILLER)

MWF 8:15

6. Introduction to Statistics.—A study of elementary statistical methods, based upon economic and social data, including statistics of population, commerce, and finance. An attempt will be made to apply statistical methods to business problems as well as to those of economics in the broader sense.

3 units, 1st semester (ELDRED)

MWF 11:15

7. Financial History of the United States.—A general historical survey of the financial policy of the national government with especial

emphasis on the Revolutionary, Civil War, and recent periods. The subject matter of the course includes the tariff, the internal revenue system, the public land policy, the growth of public expenditures, management of the public debt, and treasury administration. Open to all students who have had or are taking Economics I.

2 units, 2d semester (GARVER)

TTh 10:15

8. Resources and Trade of the United States.—An analysis of the economic resources of the United States, and a study of the methods used in marketing staple products, notably the raw materials of commerce, with some attention to organized speculation and to the problems of conservation and public control.

3 units, 1st semester (ELDRED)

MWF 8:15

9. State and Local Government.—Township, county, and state government in the United States, with special attention to California. Prerequisite, course 2.

3 units, 2d semester (WEST)

MWF 8:15

10. Bond Values and Capitalization.—A problem course in the application of the rate of interest to the valuation of income-bearing property; future sum and present worth; the rate of discount and rate of interest; simple and compound interest; the present worth of commercial paper; the capitalized value of annuities; the valuation of bonds and shares on the basis of a given rate of interest; the construction and use of bond value tables; accrued interest; the nature of depreciation; depreciation funds in theory and practice; sinking funds; the principles of capitalized value applied to mines, forests, industrial plants, franchises, inventions, etc. The student's work will consist largely in the solution of assigned problems. No advanced mathematics required, and majors of other departments will be admitted without prerequisites. This course is a prerequisite to 20, Corporation Finance, and 60, Valuation.

4 units, 1st semester (WHITAKER)

MTWTh 10:15

INTERMEDIATE COURSES

20. Corporation Finance.—Elementary survey of corporation law; the organization and management of corporations; the corporation's securities, stocks and bonds and their classification; the stock market and stock speculation; capitalization, surplus, reserve, and financial policy; the provision of new capital; promotion, underwriting, receiverships and reorganization. Prerequisite, course 10.

4 units, 2d semester (WHITAKER)

MTWTh 10:15

21. Public Finance.—A general course dealing with the principles involved in the conduct of government finances. The major part of the course is occupied with the subject of taxation, including the national, state, and local systems, but the subjects of public debts, public expenditures, the budget, and financial administration are also discussed.

3 units, 1st semester (GARVER) MWF 10:15

22. Labor Problems.—A study of the more important phases of trade unionism in England and the United States, including a history of the labor movement and a discussion of strikes, lockouts, boycotts, the blacklist, the closed shop policy, and allied questions.

3 units, 2d semester (GARVER) MWF 10:15

23. Charities.—A general survey of the leading economic, social, and individual causes of poverty, and a study of the methods and principles of modern relief.

3 units, 1st semester (LOTHROP) MWF 9:15

24. Corrections.—The causes of crime; proposed remedies; the treatment of the criminal; the prevention of crime; juvenile delinquency.

3 units, 2d semester (LOTHROP) MWF 9:15

25. Marketing.—A study of the commercial organization of the United States and an analysis of methods of marketing farm produce and manufactured articles. Attention will be given to co-operative methods, notably as developed in California, and to the recent changes which have occurred in the field of retail distribution, the growth of department stores, chain stores, mail order houses. Some time will be given to a discussion of the principles and methods of advertising.

3 units, 2d semester (ELDRED) MWF 8:15

26. The Foreign Exchanges.—A study of the system of settling international indebtedness; principles and practice of exchange banking; money markets of the world and their relations. Domestic exchange will also be considered. Prerequisite, course 4.

4 units, 2d semester (WHITAKER) MTWTh 11:15

27. Life Insurance.—General principles of insurance; their development and application to modern business; organization, forms, and technique of life insurance; industrial insurance; problems of state control.

2 units, 1st semester (GRASS) TTh 9:15

28. Property Insurance.—Theory of risk and application to modern business; organization, forms, and technique of fire and marine insurance; miscellaneous forms of property insurance.

[Not given in 1916-17.]

30. Water Transportation.—A study of the development and the significance of American and European internal waterways; ocean transportation; the Panama Canal and the relation of water transportation to railways. Prerequisite, course 5.

2 units, 1st semester (MILLER)

TTh 11:15

33. Business Administration.—An introductory study of the growth and development of the business unit; the methods employed in modern industrial and commercial enterprises; the organization and correlation of departments; psychology of selling and buying; promotion of efficiency and co-operation in the personnel.

3 units, 2d semester (GRASS)

MWF 9:15

34. Comparative Federal Government.—An inquiry into the operation of the federal principle in the United States, Germany, and the British federated colonies—Canada, Australia, and South Africa. Prerequisite, course 2.

3 units, 1st semester (WEST)

MWF 10:15

35. Parliamentary Government.—A study of the governments of England and France. Prerequisite, course 34.

3 units, 2d semester (JOHNSON)

MWF 9:15

36. Municipal Government.—Analytic and comparative study of city government in Europe and America; relation of the city to the central government; organization of city government and special problems of administration.

2 units, both semesters (WEST)

TTh 8:15

37. Colonial Government.—The systems of government of colonies and dependencies employed by England, Germany, France, Holland, and the United States. Prerequisite, courses 34, 35.

[Not given in 1916-17.]

38. American Methods of Taxation.—An examination of some of the more important taxes levied by the national and state governments. A detailed and practical study will be made of income, corporation, railroad, bank, insurance, and land taxes. The organization and methods of the leading state tax commissions will also be considered. Prerequisites, courses 8 and 21.

3 units, 2d semester (GARVER)

[Not given in 1916-17.]

ADVANCED AND GRADUATE COURSES

[The courses which follow are not open to any students with less than 55 units of university credit.]

50. Railway Rates and Regulation.—A study of rates in theory and practice; problems of freight classification and routing; distance and commodity tariffs; personal and local discriminations; the growth of state and federal regulation and a survey of important commission and court decisions. To be preceded by course 5.

3 units, 2d semester (MILLER)

MWF 8:15

52. Banking Problems.—The organization of American credit institutions under the Federal Reserve Act, and a comparison between American and European practice. [Given in alternate years.]

2 units, 2d semester (WILDMAN)

TTh 9:15

53. Population.—The purpose of this course is threefold: (1) A historical survey of the phenomena of population in the leading countries, (2) an examination of theories of population, and (3) an attempt to determine the position of population as an economic factor. Students intending to take course 54 are advised to take this course as preparatory to it.

3 units, 1st semester (ICHIHASHI)

MWF 10:15

54. Immigration and the Race Problem.—A study of immigration as a phenomenon of population, and the social and economic significance of the ethnic composition as affected by it, with special reference to the United States.

3 units, 2d semester (ICHIHASHI)

MWF 10:15

55. Advanced Accounting.—A study of more specialized systems of accounts; cost accounting; auditing; accounting problems. Prerequisites, Economics 3 and 33. [Given in alternate years.]

2 units, 2d semester (GRASS)

TTh 9:15

56. Municipal Accounting.—Forms and practice of municipal accounts; preparation of the budget and reports; public utilities accounting. Prerequisite, Economics 13. [Given in alternate years.]

[Not given in 1916-17.]

57. Government in Its Relation to Industry.—A study of political problems as affected by the changes in business organization since the industrial revolution. The "laissez faire" *versus* the "general welfare" concept of government. Measures needed to make the general welfare concept effective.

2 units, both semesters (JOHNSON)

TTh 10:15

59. Combinations and Trusts.—The forms and methods of industrial pools and combinations or "trusts," and the problem of public control. The course deals largely with the Federal Anti-trust Legislation and its construction by the courts. Prerequisite, course 20.

2 units, 1st semester (WHITAKER) TTh 11:15

60. Valuation.—The valuation of the properties of public service companies for the purposes of the regulation of rates, with an introductory study of relevant parts of the theory of value and of interest. Prerequisite, courses 10 and 20.

2 units, 1st semester (WHITAKER) MW 11:15

61. Value and Distribution.—A study of the factors which determine the values of economic goods, and of those which determine the "shares in the distribution of wealth." Prerequisite, 12 units of economics and senior standing, or the permission of the instructor.

3 units, both semesters (GARVER) MWF 8:15

62. Socialism.—A discussion of the history and fundamental principles of Socialism and allied movements. For seniors and graduates.

3 units, 2d semester [Not given in 1916-17.]

63a. History of Political Economy.—A brief survey of economic writers and literature of Europe down to 1850. The development of economic thought in its environment will be studied.

2 units, 1st semester (GRASS) TTh 11:15

63b. History of Economic Thought in the United States.—A brief survey of economic writers and literature of America, and a comparison with contemporary writers in Europe.

2 units, 2d semester (GRASS) TTh 11:15

64. Political Parties.—Development of nominating machinery and political issues in the United States, analysis of party organization, consideration of party activities and reform movements, and inquiry into the true functions of parties.

3 units, 2d semester (WEST) [Not given in 1916-17.]

65. American Politics.—An examination of the American system with reference to the extent and effectiveness of popular control, special attention being given to the problems connected with elections and legislation.

3 units, 1st semester (JOHNSON) MWF 10:15

66. Seminar in Taxation.—In 1915-16 the subject for investigation will be income taxes. Open only to seniors and graduate students who have had courses 21 and 50.

2 units, 1st semester (GARVER) By arrangement

67. Seminar in American Industrial Development since 1840.—Attention will be given to railroad and shipping development, agriculture mining, and the growth of the West, the evolution of selected industries, from the point of view of technical improvement and industrial and commercial organization; also commercial crises, and the development of methods of commercial distribution.

2 units, 2d semester (ELDRED) By arrangement

68. Seminar in Political Science.—Special problems in government. Open to seniors and graduate students. Topics and hours to be arranged.

2 or 3 units, both semesters (JOHNSON) By arrangement

68b. Seminar in Municipal Problems.—Topic for 1916-17: Police Administration. Open only to graduate students and to seniors with 30 units in the department, including course 36. Recommended Law 10.

2 units, 2d semester (WEST) By arrangement

69. Seminar in Railroad Administration.—This seminar is designed for advanced students expecting to enter railway work as a vocation.

2 units, 2d semester (MILLER) By arrangement

70. Graduate Seminar.—Open only to candidates for higher degrees and members of the department.

2 units, both semesters (WILDMAN) T 7:30-9:30

LAW

FREDERIC CAMPBELL WOODWARD, ARTHUR MARTIN CATHCART, CHARLES ANDREWS HUSTON, JOSEPH WALTER BINGHAM, CLARKE BUTLER WHITTIER, Professors.

MARION RICE KIRKWOOD, Associate Professor.

THOMAS ARMITAGE LARREMORE, Instructor.

SAMUEL WATSON CHARLES, OSCAR KENNEDY CUSHING, Lecturers.

THE LAW SCHOOL

The Law School was established, as a department of the University, in 1893. Its purpose is to provide a thorough legal education for students who are fitted by their maturity and their previous academic training to pursue professional study under university methods of instruction. The curriculum covers three academic years and con-

stitutes an adequate preparation for the practice of law in any English speaking jurisdiction. Elective courses in Code Pleading and in California Practice are offered, and graduates of this school are admitted to the California Bar without examination. A comprehensive group of courses in Public Law, of value not only to the law student but to the student who contemplates entering the diplomatic, consular, or other government service, is a feature of the curriculum.

Only college graduates and students who have completed two years of work in the pre-legal curriculum of this University, or its equivalent, are admitted as regular students. Under certain conditions persons over twenty-three years of age who are eligible for admission to the University as regular students may be admitted to the Law School as unclassified students, not candidates for a degree.

THE LIBRARY

The Law Library contains nearly 21,000 volumes, including complete sets of the English, Irish, Scotch, and Canadian reports, the reports of all the Federal courts, a practically complete set of the reports of the American States and of the Canadian Provinces, the National Reporter system, the standard collections of cases (including the American Decisions, American Reports, American State Reports, Lawyers' Reports Annotated, and American and English Railway Cases), a valuable collection of statutes, text-books, encyclopedias, digests, and other books of reference, and sets of the leading American, British, and Continental legal periodicals.

The class of 1911, upon graduation, adopted a plan for the purchase, from time to time, of works on Legal History. This collection is known as the "Class of 1911 Memorial Collection on Legal History."

Through the generosity of Justice McFarland, and his successor, Justice Melvin, the library has received, since 1907, a complete set of the records of the California Supreme Court and the District Courts of Appeal.

The University Libraries are also available for use by students of the Law School.

ADMISSION TO THE LAW SCHOOL

Admission to the professional curriculum in law is granted to students duly enrolled in the University, as follows:

I. To students who have received the degree of Bachelor of Arts, or an equivalent degree, from this University or some other institution of recognized collegiate rank.

II. To students who have received credit for two years of work

in the pre-legal curriculum offered by this University, or the substantial equivalent thereof in some other institution of recognized collegiate rank.

III. In the discretion of the Faculty of Law, to students over twenty-three years of age who cannot meet the foregoing requirements, but who are eligible for admission to the University as regular students. Such students are termed "unclassified," and are given a certificate in lieu of the degree conferred upon regular students.

ADMISSION TO THE BAR

It is provided by Section 280b of the California Code of Civil Procedure, that any person producing evidence of having satisfactorily completed the three years' course of law study prescribed by this Law School, shall be entitled to a license to practice law in all the courts of the State, subject to the right of the chief justice of the Supreme Court to order an examination, as in ordinary cases of applicants without such evidence. The certificate required by the statute will be issued, upon request, to any regular or special student who shall have received an aggregate of 75 units of credit in the Law School, including credit in Pleading and California Practice and excluding credit in the course in Introduction to the Study of Law, and who, in addition thereto, shall have received credit in the course in English Composition (English 2).

INSTRUCTION IN PRACTICE

A special effort is made to impart to the student a thorough knowledge of the rules of procedure and practice, and to enable him to acquire a creditable degree of skill and facility in the application of such rules to conditions of actual litigation. To these ends, courses are offered in Common Law and Code Pleading, and in California Practice. In the last-mentioned course particularly, the student is afforded practical experience in the commencement of actions, the preparation of pleadings, the trial of issues of fact, and the argument of questions of law.

MOOT COURT

A Moot Court, for the argument of questions of law, is conducted by the Faculty. Sessions are held twice a week throughout the second semester, and the work is open to second- and third-year law students.

ORDER OF THE COIF

A chapter of the Order of the Coif, a national law school honor society, founded to encourage scholarship and to advance the ethical standard

of the legal profession, was established in the law school in 1912. In the second semester of each year, such third-year law students as are deemed worthy of the distinction, selected from the ten per cent of the class ranking highest in scholarship, are elected to membership.

PRE-LEGAL CURRICULUM

For undergraduate students who enter with the intention of preparing for the study of law, a pre-legal curriculum is offered by the University under the direction of the Faculty of the Law School. This curriculum ordinarily occupies four years and requires that the student obtain 120 units of university credit. The equivalent of three years is given to general culture studies (for instruction in which no tuition is charged) and of one year to the professional study of law.

In electing courses in general culture subjects it is expected that 40 units will be applied as follows: To English Composition, 4; to a language or languages other than English, 12; to English and American History, or either, 9; to Economics, 6; to Mathematics and Logic, or either, 6 (six units of Physics or Chemistry, including laboratory work, may be substituted); to Introduction to the Study of Law, 3.

Students who satisfactorily complete the full pre-legal curriculum are granted the degree of Bachelor of Arts by the University, and by reason of having had one year of law study as undergraduates may satisfy the requirements for the degree of Juris Doctor by two years of graduate law study.

Students who satisfactorily complete the first two years of the pre-legal curriculum, including the 40 units specified above, may enter the law school as candidates for the degree of Bachelor of Laws.

LAW SCHOOL CURRICULUM

The work of the first year in the Law School is prescribed. The work of the second and third years is elective, but the courses in Administrative Law, Conflict of Laws, Constitutional Law, Private Corporations, Municipal Corporations, Evidence, and California Practice may not be taken, ordinarily, before the third year.

The courses offered in the Law School are as follows:

PRELIMINARY COURSE

[Open to students of all departments who have 25 units of credit, and required of pre-legal students.]

1. **Introduction to the Study of Law.**—Nature, sources, and sanction of law; outline of the historical development of English and American courts and procedure; the content, classification, and deter-

mination of rules of law, including a consideration of legal rights and duties, the doctrine of *stare decisis* and the development of some of the more elementary rules of law by combining and comparing decisions; use of law books and the law library. Selected readings and cases.

3 units, 2d semester (KIRKWOOD)

FIRST-YEAR COURSES

2. Contracts.—The formation of contracts: offer and acceptance; consideration; contracts under seal. Parties affected by contracts: contracts for the benefit of third persons; assignments; joint and several contracts. The Statute of Frauds. The performance of contracts: express and implied conditions; impossibility of performance. Illegal contracts. Discharge of contracts. Williston, Cases on Contracts, and selected California cases.

3 units, both semesters (WOODWARD)

3. Torts.—Trespass to person, to real property, and to personal property; excuses for trespass; conversion; legal cause; negligence contributory and imputed negligence; plaintiff's illegal conduct as defense; duties of land-owners; hazardous occupations; liability for animals; deceit, defamation, slander, libel, privilege, malice; malicious prosecution, criminal and civil; interference with social and business relations, inducing breaches of duty, fair and unfair competitor strikes, boycotts, business combinations. Ames and Smith, Cases on Torts.

5 units, 1st semester (CATHCART)

4. Criminal Law.—Nature and sources of criminal law; crime as an act; attempts; criminal intent; circumstances affecting illegality of act; specific offenses; crimes against the person, larceny and allied offenses, crimes against the dwelling-house, conspiracy. Beale, Cases on Criminal Law (2d ed.).

4 units, 1st semester (LARREMORE)

5. Introduction to Property.—Distinction between real and personal property. Real property: tenures; estates, nature, kinds, creation and transfer; rights in another's land, natural rights, easements, covenants running with the land, public rights, franchises, rents. Gray, Cases on Property, Vol. II (2d ed.), and selected cases.

5 units, 2d semester (KIRKWOOD)

6. Agency.—Nature of relation; appointment; liabilities of principal for agent's torts, contracts, crimes; liabilities of agent; parties

writings; undisclosed principal doctrines; delegation of agency; termination; ratification. Wambaugh, Cases on Agency.

4 units, 2d semester (HUSTON)

SECOND- AND THIRD-YEAR COURSES

7. **Constitutional Law.**—Nature and sources of American constitutional law; adoption and amendment of constitutions; separation of powers; power of judiciary to declare acts of the legislative and executive branches of government unconstitutional; citizenship; privileges and immunities of citizenship; due process of law; police power; eminent domain; taxation; ex post facto and retroactive laws; laws impairing the obligation of contracts; regulation of commerce; money; war; government of territories. Open to third-year law students and to well-prepared fourth-year students in history, economics, and political science. Hall, Cases on Constitutional Law.

4 units, 2d semester (CATHCART)

8. **Administrative Law and Public Officers.**—Administrative regulations; jurisdiction, discretion, adjudication; enforcement of orders; habeas corpus; mandamus; certiorari; equitable jurisdiction in public law. Freund, Cases on Administrative Law.

3 units, 1st semester (HUSTON) [To be given in 1917-18.]

9. **Municipal Corporations.**—Nature; creation, alteration, and dissolution; internal organization; powers; liabilities on contract and for torts; remedies. Beale, Cases on Municipal Corporations, and selected California cases.

3 units, 2d semester (HUSTON)

10. **International Law.**—International Law defined and distinguished from Municipal Law. International relations in time of peace: definition, recognition and classification of states; effect of change of sovereignty; jurisdiction on land and on the high seas; nationality. International relations as modified by war: measures short of actual war; effects of war as between enemies; relations between belligerents and neutrals. Open to all law students and to advanced students in other departments. Scott, Cases on International Law.

3 units, 2d semester (WOODWARD)

11. **Conflict of Laws.**—The principles and rules of "private international law" determining the extent to which the domestic system of law adopts and applies provisions of foreign systems in cases involving extraterritorial factors; more especially (1) nature and effect of domicile and nationality; (2) jurisdiction of courts in proceedings

in personam, proceedings *in rem*, and proceedings for *divorce*; (3) respective applicability and effect of domestic laws and foreign laws in relation to marriage and other domestic relations; contractual quasi-contractual, delictual, and judgment obligations; the creation transfer, taxation, devise, and inheritance of all forms of property interests. Beale, *Shorter Selection of Cases on Conflict of Laws*.

3 units, 1st semester (WOODWARD)

12. Admiralty.—Admiralty jurisdiction, basis; maritime contracts torts, and crimes; maritime liens, *ex contractu*, *ex delicto*, priorities discharge; bottomry and respondentia obligations; salvage; general average. Ames, *Cases on Admiralty*.

2 units, 1st semester (KIRKWOOD) [To be given in 1917-18.]

13. Introduction to Comparative Law.—A comparative study of some leading conceptions of the Roman Law, and its modern developments in the Civil Law of Continental Europe and America, with the related conceptions of the Anglo-American Common Law. Required reading.

3 units, 1st semester (HUSTON)

14. Title to Land I: Possession and Landlord and Tenant.—Nature and importance of legal possession; remedies to recover legal possession wrongfully withheld; effect of statutes of limitations; tacking of periods of successive adverse possessions; actual occupation a element of title to legal possession; "constructive" adverse possession under color of title; intent as element of title to legal possession possession through occupation of a servant or agent; possession through occupation of a tenant; relationship of landlord and tenant compared with rights and liberties of persons in various other relations; possession through a co-tenant's occupation; exceptions and interruptions to running of statutes of limitations. Creation of relationship of landlord and tenant; duration of tenant's interest; remedies of landlord for non-performance of tenant's obligations; remedies of tenant against landlord; covenants running with the land between landlord and tenant; rights, liberties, and duties of landlord and tenant with respect to third persons. Gray, *Cases on Property* (2 ed.), Vol. III; and selected cases and statutes.

3 units, 1st semester (BINGHAM)

15. Title to Land II: Conveyances.—Accretion; prescription; creation of interests in land by agreement or conveyance; methods of transfer of interests in land at common law and under statutes; execution of deeds; interpretation of instruments of conveyance; cov

enants for title; conditions; fraudulent conveyances; recording. Pre-requisite, course 5. Gray, Cases on Property (2d ed.), Vols. III and VI; and selected cases and statutes.

3 units, 2d semester (BINGHAM)

16. Wills.—Acquisition of property on the death of former owner, escheat, descent, occupancy, gifts, *mortis causa*, the making, revocation, and republication of wills, ademption and lapse of legacies. Pre-requisite, course 5. Gray, Cases on Property, Vol. IV (2d ed.), and selected cases.

3 units, 1st semester (BINGHAM) [To be given in 1917-18.]

17. Future Interests.—Vested and executory interests; construction of language creating future interests; powers; rule against perpetuities; provisions for forfeiture and restraints on alienation. Pre-requisite: courses 7 and 15. Gray, Cases on Property, Vol. V and part of Vol. VI (2d ed.), and selected cases and statutes.

4 units, 1st semester (BINGHAM) [To be given in 1917-18.]

18. Water Rights and Irrigation Law.—A course in the intensive study of the law of water supply rights, with especial reference to water rights in the Western States. Bingham, Cases on Water Rights.

3 units, 1st semester (BINGHAM)

19. Mining Law.—A course on mining titles under the Federal mining acts, with especial reference to mining rights in the Western States and Alaska. Costigan, Cases on Mining Law; and legislative enactments.

2 units, 1st semester (BINGHAM)

20. Persons and Domestic Relations.—Parent and child; custody, support, services, and earnings of child; relations as to torts; adoption. Infants: period of infancy; infants' contracts and conveyances, torts, and crimes. Husband and wife; rights of husband as to wife's property; rights of each as to earnings, services, and society of the other; husband's interest in damages for tort to wife; husband's liability for torts or contracts of wife; husband's duty to support wife and wife's authority to bind husband by her contracts; married women's contracts, conveyances, and devises; estoppel of married women; liability of married women for torts and responsibility for crimes; contracts, conveyances, and suits between husband and wife; husband's right to custody of wife. Marriage: promise to marry and breach; marriage as a contract or relation; annulment; divorce; separation. Kales, Cases on Persons and Domestic Relations, and Vernier, Cases on Marriage and Divorce.

3 units, 1st semester (LARREMORE)

21. Quasi-Contracts.—Origin and nature of quasi-contracts: Benefits conferred in misreliance on right or duty; general principle of misreliance resulting from mistake of law; misreliance on invalid contract, on contract unenforceable because of Statute of Frauds, on illegal contract, on contract impossible of performance, on contract unenforceable because of breach, on supposed requirement of valid contract, on non-contract obligation, on ownership of property: Benefits conferred through dutiful intervention in another's affairs: Benefits conferred under constraint; constraint of duress, of legal proceedings, of tax or assessment: Action for restitution as alternative remedy for breach of contract and for tort. Woodruff, Cases on Quasi-Contracts.

3 units, 1st semester (WOODWARD) [To be given in 1917-18.]

22. Public Utilities.—The nature, rights, and duties of public service callings; railroads and canals; telephone and telegraph; gas, water, irrigation, and other public utilities. Burdick, Cases on the Law of Public Service.

2 units, 1st semester (CATHCART)

23. Bailments and Carriers.—Bailments in general, including bailments for hire, for services to be performed, and for hired use. Special classes of bailments involving ordinary liability: pledges; warehousemen. Special classes of bailments involving exceptional liability: innkeepers; common carriers of goods; common carriers of passengers. Case book to be announced.

3 units, 2d semester (LARREMORE) [To be given in 1917-18.]

24. Sales.—Subject matter of the contract; transfer of property and title; destruction of the goods and risk of loss; obligations of seller and buyer; rights of unpaid seller against the goods; remedies of the seller on the contract; remedies of the buyer on the contract; Statute of Frauds. Woodward, Cases on Sales.

4 units, 2d semester (WOODWARD) [To be given in 1917-18.]

25. Bills and Notes.—Negotiability; form and inception, form of bill and of note, acceptance, delivery, consideration; negotiation, transfer, holder in due course; liability of parties, maker and acceptor, drawer and indorser, transferee; discharge; effect of the Negotiable Instruments Law and California statutes. Case book to be announced.

4 units, 2d semester (LARREMORE)

26. Partnership.—Nature of a partnership, its purposes, and members; creation of partnerships; nature of partner's interest; firm name and good will; mutual rights and duties of partners; actions

between partners, at law and in equity; powers of partners; liability for acts of partners in contract and tort; general liability of partners; dissolution and notice; consequences of dissolution; dissolution agreements respecting debts; distribution of assets to creditors, and between partners; limited partnerships. Case book to be announced.

3 units, 1st semester (LARREMORE) [To be given in 1917-18.]

27. Private Corporations.—The nature of a corporation; the formation and organization of corporations; irregular incorporation; corporate powers; ultra vires; promoters; directors; shareholders; creditors; stock issue and payment, transfer. Open to third-year law students only. Warren, Cases on Corporations (2d ed.), and selected California cases.

4 units, 1st semester (HUSTON)

28. Insurance.—Marine, fire, and life insurance. Insurable interest in various kinds of policies; concealments; misrepresentations; warranties and other matters affecting the validity of the contract; amount of recovery; subrogation; waiver, estoppel, election; powers of agents; assignees and beneficiaries.

3 units, 2d semester (HUSTON) [To be given in 1917-18.]

29. Suretyship.—Personal suretyship compared with real suretyship (mortgages, pledges, liens, etc.); suretyship obligations compared with insurance and indemnity obligations; guaranty and other forms of suretyship in relation to the Statute of Frauds; suretyship in transactions involving negotiable instruments; fidelity contracts and judicial bonds; surety's defenses due to original defects in his obligation or to its subsequent discharge; surety's right to subrogation, indemnity, contribution, or exoneration; creditor's right to surety's securities. Ames, Cases on Suretyship.

3 units, 2d semester (WHITTIER)

30. Mortgages.—All forms of mortgage security, both real and chattel; essential elements of legal and equitable mortgages; legal and equitable rights, powers and remedies of mortgagor and mortgagee with respect to title, possession, rents and profits, waste, collateral agreements, foreclosure, redemption; priorities; marshaling; extension of mortgages; assignment of mortgages; discharge of mortgages. Kirchwey, Cases on Mortgage.

2 units, 2d semester (WHITTIER) [To be given in 1917-18.]

31. Equity I: Contracts and Torts.—Historical development of equity; relation between equitable rights and powers and legal rights and powers; jurisdiction, procedure, and remedies of courts of equity;

specific performance of contracts, with emphasis on the special relations between vendors and purchasers of realty; specific prevention and specific reparation of torts, including waste, trespass, nuisance, infringement of patents and copyrights, interference with business relations, violation of rights of privacy. Case book to be announced.

4 units, 1st semester (KIRKWOOD)

32. Equity II: Trusts.—The Anglo-American system of uses and trusts. The creation, the transfer and the extinguishment of all forms of trust interests, express, resulting, and constructive; priorities between competing equities; the construction of trust dispositions; the special doctrines of charitable trusts. Ames, *Cases on Trusts* (2d ed.

4 units, 2d semester (BINGHAM)

33. Equity III: Interpleader, Bills of Peace, etc.—Special equitable remedies, including: interpleader; bills of peace and *quia timet*; cancellation of contract; clouds on title; perpetuation of testimony; rights of future enjoyment; reformation and rescission of contract for mistake. Case book to be announced.

2 units, 1st semester (KIRKWOOD)

34. Damages.—Respective functions of court and jury in estimating damages; exemplary, liquidated, nominal, direct, and consequential damages; avoidable consequences; counsel fees; certainty, compensation, damages for non-pecuniary injuries; value; interest; and damages in certain actions of tort and contract. Beale, *Cases on Damages* (2d ed.).

2 units, 1st semester (CATHCART) [To be given in 1917-18]

35. Bankruptcy.—Jurisdiction of the United States and the several States; who may be a bankrupt; who may be petitioning creditor; acts of bankruptcy; what property passes to the trustee; provable claims; duties and powers of the bankrupt and his trustee; protection, exemptions and discharge. Williston, *Cases on Bankruptcy*.

3 units, 1st semester [Not to be given in 1916-17]

36. Common Law Pleading.—The principal forms of action, including their scope and the necessary allegations and methods of pleading defenses in each; demurrers, general and special; traverses and pleas in confession and avoidance; dilatory pleas; amendments; motions based on the pleadings. Whittier, *Cases on Common Law Pleading*.

3 units, 1st semester (WHITTIER)

37. Code Pleading.—The civil action; parties; splitting and joining actions; the complaint, including the facts constituting the cause of

action, the methods of stating them, and the prayer for relief; the answer, including general and specific denials, affirmative defenses and counterclaims; the demurrer; the reply; motions; bills of particulars; amendment and aider; construction of pleadings. Prerequisite: course 36. Selected cases.

3 units, 2d semester (CATHCART)

38. Evidence.—Judicial notice; presumptions and burden of proof; functions of court and jury; conjectural evidence; character evidence; hearsay and the exceptions to its exclusion; opinion; real evidence; writings, including authorship, proof of contents, "parol evidence rule" and construction; witnesses, including competency, privilege, examination, impeachment, and rehabilitation. Open to students having 31 units of credit in law. Thayer, *Cases on Evidence* (2d ed.).

3 units, both semesters (WHITTIER)

39. California Practice.—Organization and jurisdiction of courts; court records and files; proceedings prior to judgment, including: service and return of summons and motions relating thereto, appearances, provisional remedies, such as attachment, arrest, etc., *lis pendens*, the trial, exceptions and findings, verdict; the judgment, its entry and satisfaction; proceedings subsequent to judgment, including: stay of execution, costs, execution, motion for new trial, appellate proceedings; probate and administration proceedings; special proceedings, including writs of certiorari, mandamus, and prohibition; introduction to jurisdiction and procedure of Federal courts. Prerequisite, course 37. Open to students having 31 units of credit in law. California Code of Civil Procedure; also selected California cases.

2 units, both semesters (CHARLES)

40. Moot Court.—

A. Instruction in Legal Bibliography and the use of law books.

B. Argument of cases on submitted statements of facts; briefs; preparation of opinions.

2 units, 2d semester (KIRKWOOD, LARREMORE)

SPECIAL LECTURES

In addition to the regular professional courses, a few special lectures, most of them of a practical character, are given each year by experienced lawyers of the California Bar.

COURSES IN OTHER DEPARTMENTS

Courses offered by other Departments of the University are open to pre-legal and law students. Of special interest and importance are

the course in the Institutes of Justinian, in the Latin Department, the courses in Constitutional History, in the History Department, and various courses in Economics and Political Science.

THE SUMMER TERM

The primary purpose of the Summer Term is to enable law students in this and other schools, to shorten materially the period of preparation for the bar, attendance at two summer terms making it possible to complete the three years' law curriculum in two and one-half calendar years. Incidentally, however, an opportunity to obtain systematic university instruction in law is afforded other persons of adequate training.

The Summer Term for the year 1916 will open Monday, June 19 and continue for six weeks, closing Saturday, July 29th.

The following courses will be given:

2a. Contracts.—Course 2 in the regular curriculum, somewhat abridged.

5 units (WOODWARD)

20a. Persons and Domestic Relations.—Identical with course 2 in the regular curriculum.

3 units (LARREMORE)

31a. Equity I.—Identical with course 31 in the regular curriculum.

4 units (KIRKWOOD)

34a. Damages.—Identical with course 34 in the regular curriculum.

2 units (CATHCART)

37a. Code Pleading.—Identical with course 37 in the regular curriculum.

2 units (CATHCART)

40a. Moot Court.—Course 40 in the regular curriculum, abridged.

1 unit (LARREMORE)

The above courses will be open to all students who are qualified for admission to the regular law school curriculum, except that for admission to Damages and Moot Court a knowledge of Contracts and Torts will be required.

The tuition fee for the summer term will be twenty-five dollars. In addition there will be a syllabus fee of fifty cents for each course. No other fees will be charged.

MATHEMATICS

ROBERT EDGAR ALLARDICE, RUFUS LOT GREEN, HANS FREDERIK Blichfeldt, Professors.

The courses in this department have been arranged to meet the wants of two classes of students—students whose major subject is Mathematics, and students who, while taking their major in some other department, desire to include some mathematics in their course. Students in Engineering are provided for in the Department of Applied Mathematics.

For students whose major subject is Mathematics the following programme of work is recommended: In the first year, courses 3 and 4; in the second year, courses 9, and 10 or 21; in the third year, courses 11, 12, and 15; while the work during the fourth year and for graduate students may be selected from the remaining courses, and from the Department of Applied Mathematics. The advanced courses will, for the most part, be given once in two or once in three years, and it is hoped that the advanced students will thus have the opportunity of studying the more important branches of modern mathematics.

Students whose major subject is Mathematics are recommended to begin the study either of French or of German in their freshman year.

Students who desire to take one or more years of Mathematics as a part of a liberal training are recommended to begin their work in this Department with one or more of the courses 1, 2, 3, 6, and 7.

THE TEACHER'S RECOMMENDATION.—For the High School Recommendation in Mathematics the following courses are required: 1, 2, 3, 4, 9, and 10 or 6.

1. **Trigonometry.**—Elementary course, with applications involving logarithmic calculation.

3 units, either semester (GREEN) MWF 9:15

2. **Solid Geometry.**—Elementary course.

2 units, either semester (BLICHFELDT) TTh 9:15

3. **Algebra.**—Fundamental laws, degree, symmetry, indeterminate coefficients, remainder theorem, factors, introduction to theory of equations. Presupposes entrance credit in elementary algebra.

5 units, 1st semester (GREEN) MTWThF 8:15

4. **Co-ordinate Geometry.**—An elementary course in the analytic geometry of the conic sections. Presupposes course 3.

5 units, 2d semester (GREEN) MTWThF 8:15

[Students making Mathematics their major subject should take course 3 and 4 as the first year's work, and those who have not had Trigonometry should also take course 1.]

5. Advanced Algebra.

2 units, 2d semester (BLICHFELDT) TTh 10:1

6. Plane Geometry.—This course includes a rapid revision of elementary geometry, together with additional theorems and reference to modern theories. It is recommended to those who expect to teach mathematics, and presupposes entrance credit in plane geometry.

2 units, both semesters (ALLARDICE) TTh 10:1

7. General Course.—A brief and elementary survey of the principles of Algebra, Trigonometry, Co-ordinate Geometry, and Calculus. Presupposes elementary algebra and plane geometry.

3 units, both semesters (BLICHFELDT) MWF 10:1

8. Teachers' Course in Algebra.

3 units, 2d semester (GREEN)

9. Differential and Integral Calculus.—Lectures on the Differential and Integral Calculus, with applications to the theory of plane curves on the lines of Williamson's treatises.

3 units, both semesters (ALLARDICE) MWF 9:1

10. Advanced Co-ordinate Geometry.—A continuation of course 4.

2 units, both semesters (GREEN) TTh 9:1

11. Advanced Calculus.—A continuation of course 9.

3 units, 1st semester (ALLARDICE) MWF 11:1

12. Theory of Functions.—Elementary course.

3 units, 2d semester (ALLARDICE) MWF 11:1

13. Non-Euclidean Geometry.—Presupposes a course in Calculus.

3 units, 2d semester (BLICHFELDT) MWF 10:1

14. Modern Co-ordinate Geometry.—Introductory course.

3 units, 1st semester (GREEN) [Not given in 1916-17.]

15. Differential Equations.

3 units, 1st semester (BLICHFELDT) MWF 9:1

17. Advanced Theory of Functions.

4 units, both semesters (ALLARDICE) By arrangement

18. Theory of Equations.

3 units, both semesters (GREEN) [Not given in 1916-17.]

21. Projective Geometry.

2 units, both semesters (ALLARDICE) TTh 11:1

23. Mathematics of Investment and Insurance.

3 units, both semesters (GREEN)

25. Theory of Groups.

3 units, 1st semester (BLICHFELDT) [Not given in 1916-17.]

26. Higher Plane Curves.

3 units, both semesters (ALLARDICE)

TTh 2:30

APPLIED MATHEMATICS

LEANDER MILLER HOSKINS, Professor.

HALCOTT CADWALADER MORENO, SIDNEY DEAN TOWNLEY, WILLIAM

ALBERT MANNING, Associate Professors.

ERNEST WILLIAM PONZER, Assistant Professor.

The courses in Applied Mathematics are planned primarily to meet the needs of students in Engineering. The aim is to make these courses practical in the sense of furnishing thorough drill on fundamental principles and much practice in their application. Emphasis is laid upon accuracy and system in the solution of numerical problems. Students whose training in arithmetical work has been deficient, or who are otherwise inadequately prepared, or who lack aptitude for mathematical study, can not pursue these courses successfully.

Students majoring in any Engineering department should have entrance credit in all preparatory subjects in mathematics, including Algebra (at least one and a half units), Plane and Solid Geometry, and Plane Trigonometry. This preparation is required for admission to any of the following courses.*

Course 1 embraces the regular first-year work, and courses 2 and 3 the regular second-year work for all students in Engineering. Those deficient in the work of the first year are not admitted to second-year courses. This requirement will be strictly enforced, whether the previous work has been taken in this University or elsewhere.

1. First-year Mathematics.—This course embraces (a) Algebra, (b) Trigonometry, (c) Co-ordinate Geometry. The work begins with a rapid review of elementary algebra, intended to test the student's familiarity with fundamental principles and operations, those showing de-

*Courses in Solid Geometry and Trigonometry are given in the Department of Mathematics (courses 1 and 2).

ficient preparation not being permitted to continue. This review is followed by more advanced work in algebra, but emphasis is laid on the thorough mastery of the ordinary rules rather than on covering a large amount of ground. In the second part of the course much attention is paid to reviewing and enforcing the fundamental principles of plane trigonometry, and especially to the numerical solution of triangles using both natural and logarithmic functions. In co-ordinate geometry it is aimed to familiarize the student with the method of co-ordinates, so that he can apply it independently to simple problems, rather than to devote much attention to a detailed study of the properties of the conic sections or other curves. The course is open to students having entrance credit in Algebra (at least $1\frac{1}{2}$ units), Plane and Solid Geometry, and Plane Trigonometry.

5 units, both semesters (MORENO, MANNING, PONZER)

MTWThF 8:15, 10:15

2. Calculus.—An elementary course on Differential and Integral Calculus, in which emphasis is laid on fundamental principles and simple applications.

3 units, both semesters (HOSKINS, MORENO, PONZER) MWF 9:15

3. Theoretical Mechanics.—An elementary course, covering the fundamental principles of Statics, Kinematics, and Kinetics, restricted mainly to coplanar forces and to plane motion of particles and of rigid bodies. An elementary treatment of Graphic Statics is included. The course is designed as preparation for the courses in Applied Mechanics taken by students of Engineering, but is open to all whose preparation includes the equivalent of course 1. Calculus must either precede this course or be taken at the same time.

5 units, both semesters (HOSKINS, MANNING, TOWNLEY)

MTWThF 10:15

4. Advanced Calculus.—This course is designed to meet the needs of students who are preparing to pursue the more mathematical parts of engineering theory.

2 units, 1st semester (MORENO)

[Given if there is sufficient demand]

8. Engineering Mathematics.—This course is designed to meet the needs of advanced students in Electrical Engineering, and should be taken by those intending to take course 5 in Electrical Engineering.

2 or 3 units, 1st semester (MORENO)

TTh 9:15

9. Graduate Courses.—Advanced courses in Theoretical Mechanics, Hydromechanics, Theory of Heat, Theory of the Potential Function,

Theory of Elasticity, or other subjects, may be arranged for students having the requisite mathematical training.

ASTRONOMY AND GEODESY

The course in Descriptive Astronomy is designed especially to meet the needs of students who have time for only a general knowledge of the subject. Course 11 is designed especially for students of Engineering and Geology who desire a working knowledge of practical astronomy. The other courses are intended for students of Applied Mathematics or Civil Engineering who wish to prepare themselves for geodetic work.

10. **Descriptive Astronomy.**—This course consists of a general survey of the various branches of astronomy, including a study of the celestial sphere, the bodies of the solar system, comets, the fixed stars, and other heavenly bodies. The treatment is non-mathematical.

3 units, 1st semester (TOWNLEY) MWF 11:15

11. **Practical Astronomy.**—The theory and practice of the determination of latitude, azimuth, time, and longitude, with sextant and engineer's transit. Intended especially to meet the requirements of students of civil engineering. Course 1 and surveying are prerequisites.

3 units, 2d semester (TOWNLEY) MWF 11:15

12. **Advanced Practical Astronomy.**—A continuation of course 11. Precise methods of determining time, latitude, etc., by means of the universal instrument.

Either semester, hours and credits to be adjusted (TOWNLEY)

13. **Adjustment of Observations.**—Theory of the method of least squares, with applications. Credit in course 2 or its equivalent is a prerequisite.

2 units, 1st semester (TOWNLEY)

14. **Geodesy.**—Study of the form and dimensions of the earth and the practical methods of geodetic work. Courses 11 and 13 are prerequisites.

2 units, 2d semester (TOWNLEY)

PHYSICS

PHYSICS 1. LECTURE Professor

PHYSICS 2. LECTURE Associate Professor.

PHYSICS 3. LECTURE DAVID JOSEPH GRANT BROWN, PERLEY ASON ROSS.

PHYSICS 4. LECTURE

PHYSICS 5. LECTURE EDWARD EVERETT MCCABE, DAYTON L. ULREY, PEARL

PHYSICS 6. LECTURE

[Courses 1, 2, 4, and 5 constitute a course in General Physics, and are intended to precede the advanced courses.]

1. Dynamics.—Including hydrostatics and pneumatics. Open only to students who have had algebra and plane geometry. Required as a preparation for each of the courses following (except 6 and 7). Two lectures and two laboratory periods per week.

4 units, either semester (ROSS)

Lec. TTh 9:15; Lab. WThF 1:30-4:30

2. Electricity and Magnetism.—Three laboratory periods per week, which will include two hours of lecture and discussion. Prerequisite: course 1, or an equivalent.

4 units, 1st semester (DREW)

WThF 1:30-4:30

3. Heat.—One lecture and two laboratory periods per week. Prerequisite: course 1.

3 units, 2d semester (ROSS) Lec. W 1:30; Lab. MT 1:30-4:30

4. Sound.—Including wave-motion. Three laboratory periods per week. Prerequisites: course 1, and trigonometry.

3 units, 1st semester (BROWN)

Lab. MTW 1:30-4:30

5. Elementary Optics.—Three laboratory periods per week. Prerequisites: course 1, and trigonometry.

3 units, 2d semester (BROWN)

Lab. WThF 1:30-4:30

6. General Physics.—A course intended primarily for students in Engineering but open to others who have had equivalent preparation. Three experimental lectures and recitations and one laboratory period per week. Prerequisite: entrance Physics and course 3 in Applied Mathematics or may be taken concurrently with the latter.

PHYSICS 7. LECTURE

PHYSICS 8. LECTURE

Lec. MTW 1:30-4:30 Lab. W or Th or F 1:30-4:30

b. Electricity and Magnetism.

4 units, 2d semester (ROGERS)

Lec. MWF 11:15; Lab. W or Th or F 1:30-4:30

7. General Physics.—A non-mathematical course intended primarily for students in Biological Science and students preparing for the study of Medicine, but open to others. Two lectures and two laboratory periods per week throughout the year.

4 units, both semesters (DREW)

Lec. MW 10:15; Lab. (I) MT 1:30-4:30 (primarily for pre-medical students), (II) TTh 9:15-12:15

8. Mechanical Measurements.—A course in exact measurements of mass, length, time, gravity, elasticity, surface tension, etc., using balance, dividing engine, cathetometer, chronograph, etc. Two laboratory periods per week. Prerequisite, course 1.

2 units, 2d semester (BROWN)

Lab. MT 1:30-4:30

9. Electrical Measurements.—Open to students who have taken course 2 or course 6b. Students who have not taken or completed 6b are expected to register for more than two units.

2 or 4 units, 1st semester (ROGERS)

Lab. (I) TTh 9:15-12:15, (II) MT 1:30-4:30

9a. Photometry and Illumination.—Open to students who have completed course 9.

1 unit, 2d semester (ROGERS)

By arrangement

10. Advanced Optics.—Two laboratory periods per week. Prerequisite, course 5.

2 units, 2d semester (SANFORD)

Lab. ThF

11. Advanced Physics.—Lectures. Prerequisites, courses 1, 2, 3, 4, and 5, or their equivalent.

5 units, both semesters (SANFORD)

12. Analytic Mechanics.—Lectures. Prerequisites, course 1 and the Differential and Integral Calculus.

4 units, 1st semester (ROSS)

By arrangement

3. Teachers' Course in Elementary Physics.—Prerequisites: courses 1, 2, 3, 4, and 5, or their equivalent.

1 unit, both semesters (SANFORD)

W 10:15

4. Advanced Heat.—Lectures on selected topics, including the elements of Kinetic Theory and Thermodynamics. Prerequisites: courses 1 and 3, and calculus.

3 units, 2d semester (DREW)

By arrangement

15. Vibratory Motion and Wave Motion.—Recitations and lectures illustrated by occasional lecture experiments and a few carefully executed laboratory experiments. Prerequisites: courses 1 and 12, or the equivalent, and calculus.

2 units, both semesters (ROGERS)

TTh 8:

16. The Literature of Physics.—A reading course open to students who have the preparation required for Physics 11. A general review of the literature of Physics, especially journal literature.

2 units, either semester (SANFORD)

TTh 10:

18. Advanced Electricity.—Recitations and lectures illustrated by occasional lecture experiments and a few carefully executed laboratory experiments. Prerequisites: courses 2 or 6b, 9, 12, and calculus.

3 units, both semesters (ROGERS)

MWF 9:

19. Investigation of Original Problems in the Laboratory.—How to be determined in each case.

(SANFORD)

By arrangement

For graduation in the department the minimum requirement is units of Physics and Chemistry, of which at least 30 units must be Physics. All elementary courses except 6 and 7 are suitable for Physics majors.

THE TEACHER'S RECOMMENDATION.—The minimum requirement is courses 1, 2, 3, 4, 5, or an equivalent, and course 13.

LABORATORY FEES.—Courses 1, 2, 3, 4, 5, 7, 8, and 10, \$4 each per semester; course 6a and 6b, \$3 each, per semester; course 9, \$5 per semester; course 19, \$2 per unit per semester.

CHEMISTRY

JOHN MAXSON STILLMAN, LIONEL REMOND LENOX, EDWARD CURTIS FRANKLIN, STEWART WOODFORD YOUNG, ROBERT ECKLES SWANSON, Professors.

JOHN PEARCE MITCHELL, Associate Professor.

WILLIAM HENRY SLOAN, Assistant Professor

GEORGE SHAMBAUGH BOHART, ALICE RUTH BERGER, WILLIAM EDMUND BURKE, Instructors.

I. LECTURE COURSES

1. General Inorganic Chemistry.—Comprising a systematic treatment of elementary principles and of the properties of the more i

b. Electricity and Magnetism.

4 units, 2d semester (ROGERS)

Lec. MWF 11:15; Lab. W or Th or F 1:30-4:30

7. General Physics.—A non-mathematical course intended primarily for students in Biological Science and students preparing for the study of Medicine, but open to others. Two lectures and two laboratory periods per week throughout the year.

4 units, both semesters (DREW)

Lec. MW 10:15; Lab. (I) MT 1:30-4:30 (primarily for pre-medical students), (II) TTh 9:15-12:15

8. Mechanical Measurements.—A course in exact measurements of mass, length, time, gravity, elasticity, surface tension, etc., using balance, dividing engine, cathetometer, chronograph, etc. Two laboratory periods per week. Prerequisite, course 1.

2 units, 2d semester (BROWN)

Lab. MT 1:30-4:30

9. Electrical Measurements.—Open to students who have taken course 2 or course 6b. Students who have not taken or completed 6b are expected to register for more than two units.

2 or 4 units, 1st semester (ROGERS)

Lab. (I) TTh 9:15-12:15, (II) MT 1:30-4:30

9a. Photometry and Illumination.—Open to students who have completed course 9.

1 unit, 2d semester (ROGERS)

By arrangement

10. Advanced Optics.—Two laboratory periods per week. Prerequisite, course 5.

2 units, 2d semester (SANFORD)

Lab. ThF

11. Advanced Physics.—Lectures. Prerequisites, courses 1, 2, 3, 4, and 5, or their equivalent.

5 units, both semesters (SANFORD)

12. Analytic Mechanics.—Lectures. Prerequisites, course 1 and the Differential and Integral Calculus.

4 units, 1st semester (ROSS)

By arrangement

13. Teachers' Course in Elementary Physics.—Prerequisites: courses 1, 2, 3, 4, and 5, or their equivalent.

1 unit, both semesters (SANFORD)

W 10:15

14. Advanced Heat.—Lectures on selected topics, including the elements of Kinetic Theory and Thermodynamics. Prerequisites: courses 1 and 3, and calculus.

3 units, 2d semester (DREW)

By arrangement

9. Physical-Chemical Measurements.—An informal course of lectures given as needed in connection with course *f*.

No credit (YOUNG)

By arrangement

10. Applied Physical Chemistry.—For students in Analytical Chemistry and Metallurgy.

2 units, 2d semester (YOUNG)

MW 9: 15

11. Physiological Chemistry.—Lectures on the chemical composition and action of the tissues and secretions of the animal body, the digestion of foods, and the elimination of waste products. Open to students who have completed course 3.

3 units, 1st semester (SWAIN)

MWF 11: 15

12. Seminary in Chemistry.—Discussion of assigned topics in theoretical and general chemistry. Open to graduate students, and to advanced undergraduates in Chemistry, with the approval of the Faculty in Chemistry.

1 unit, both semesters

W

13. Chemical Calculations.—Consists of a series of problems designed to review the fundamental principles of analytical and theoretical chemistry. Open to juniors and seniors who have had courses 2 and *d*. A series of more advanced problems will be given by arrangement.

2 units, 2d semester (MITCHELL)

TTh 8: 15

II. LABORATORY COURSES

a. General Inorganic Chemistry.—In connection with course 1.

a1. Illustrating fundamental laws and principles of elementary chemistry, for students who have not received entrance credit in Chemistry.

2 units, 1st semester (MITCHELL, BOHART) MT or ThF 1:30-4:30

a11. Inorganic preparations and general chemistry. For students who either have completed *a1* or have received entrance credit in Chemistry.

2 units, either semester (MITCHELL, BOHART) MT or ThF 1:30-4:30

b. Qualitative Analysis.—Open to students who have completed courses 1 and *a11*.

3 afternoons, either semester (LENOX, BERGER) By arrangement

c. Preparation of Typical Carbon Compounds.—Open in connection with course 3 to students who have completed course *b*.

3 afternoons, either semester (FRANKLIN) By arrangement

d. Quantitative Analysis.—Training in manipulation in gravimetric and volumetric methods. Work begins either semester. Students in

other departments than Chemistry may register for three afternoons if they cannot arrange for four, as is recommended. Open to students who have completed courses 6 and *b*.

4 afternoons, either semester (SLOAN) By arrangement

c. Mineral Analysis.—Systematic analysis of representative minerals. Open to students who have completed course *d*, and required of students whose major subject is Chemistry, unless *f* or *g* be elected instead.

4 afternoons, either semester (LENOX, SLOAN) By arrangement

f. Physical-Chemical Measurements.—Exercises in the practice of physical-chemical laboratory methods. Open to students who have completed or are taking course 8, and who have completed course *d*.

3 or 5 units, either semester (YOUNG) By arrangement

g. Physiological Chemistry.—A laboratory course including a preliminary study of the proteins, carbohydrates, and fats, and the action of the various digestive fluids upon them, followed by a chemical examination of the bile, blood, milk, the chief tissues of the animal body, and the excretions. In connection with course 11.

3 afternoons, 1st semester (SWAIN) By arrangement

h. Volumetric Assaying Methods.—Open to students who have completed course *d*.

2 afternoons, 1st semester (LENOX)

Lab. by arrangement; Lec. Th 1:30

i. Physical-Chemical Laboratory.—A course recommended in connection with Chemistry 10.

(YOUNG)

By arrangement

k. Analytical Chemistry.—A condensed course intended exclusively for students preparing for medicine. Not open to Chemistry majors, and not accepted in place of the regular courses* in qualitative and quantitative analysis as prerequisites for advanced laboratory courses, with the exception of physiological chemistry for medical students.

[Students preparing for Medicine who have, however, already completed the regular course in Qualitative Analysis (6 and *b*), may register for *kb* for two hours credit.]

In 1915-16 the course *kb* must be begun by October 20th in the first semester and about March 1st in the second semester. The classes will be expected to finish *ka* by those dates. Course *k* (*a* and *b*) must be registered at the same time—for four units total credit. Either semester.

9. Physical-Chemical Measurements.—An informal course of lectures given as needed in connection with course *f*.

No credit (YOUNG)

By arrangement

10. Applied Physical Chemistry.—For students in Analytical Chemistry and Metallurgy.

2 units, 2d semester (YOUNG)

MW 9:15

11. Physiological Chemistry.—Lectures on the chemical composition and action of the tissues and secretions of the animal body, the digestion of foods, and the elimination of waste products. Open to students who have completed course 3.

3 units, 1st semester (SWAIN)

MWF 11:15

12. Seminary in Chemistry.—Discussion of assigned topics in theoretical and general chemistry. Open to graduate students, and to advanced undergraduates in Chemistry, with the approval of the Faculty in Chemistry.

1 unit, both semesters

W 4

13. Chemical Calculations.—Consists of a series of problems designed to review the fundamental principles of analytical and theoretical chemistry. Open to juniors and seniors who have had courses 2 and *d*. A series of more advanced problems will be given by arrangement.

2 units, 2d semester (MITCHELL)

TTh 8:15

II. LABORATORY COURSES

a. General Inorganic Chemistry.—In connection with course 1.

aI. Illustrating fundamental laws and principles of elementary chemistry, for students who have not received entrance credit in Chemistry.

2 units, 1st semester (MITCHELL, BOHART) MT or ThF 1:30-4:30

aII. Inorganic preparations and general chemistry. For students who either have completed *aI* or have received entrance credit in Chemistry.

2 units, either semester (MITCHELL, BOHART) MT or ThF 1:30-4:30

b. Qualitative Analysis.—Open to students who have completed courses 1 and *aII*.

3 afternoons, either semester (LENOX, BERGER) By arrangement

c. Preparation of Typical Carbon Compounds.—Open in connection with course 3 to students who have completed course *b*.

3 afternoons, either semester (FRANKLIN) By arrangement

d. Quantitative Analysis.—Training in manipulation in gravimetric and volumetric methods. Work begins either semester. Students in

other departments than Chemistry may register for three afternoons if they cannot arrange for four, as is recommended. Open to students who have completed courses 6 and *b*.

4 afternoons, either semester (SLOAN) By arrangement

e. Mineral Analysis.—Systematic analysis of representative minerals. Open to students who have completed course *d*, and required of students whose major subject is Chemistry, unless *f* or *g* be elected instead.

4 afternoons, either semester (LENOX, SLOAN) By arrangement

f. Physical-Chemical Measurements.—Exercises in the practice of physical-chemical laboratory methods. Open to students who have completed or are taking course 8, and who have completed course *d*.

3 or 5 units, either semester (YOUNG) By arrangement

g. Physiological Chemistry.—A laboratory course including a preliminary study of the proteins, carbohydrates, and fats, and the action of the various digestive fluids upon them, followed by a chemical examination of the bile, blood, milk, the chief tissues of the animal body, and the excretions. In connection with course 11.

3 afternoons, 1st semester (SWAIN) By arrangement

h. Volumetric Assaying Methods.—Open to students who have completed course *d*.

2 afternoons, 1st semester (LENOX)

Lab. by arrangement; Lec. Th 1:30

i. Physical-Chemical Laboratory.—A course recommended in connection with Chemistry 10.

(YOUNG)

By arrangement

k. Analytical Chemistry.—A condensed course intended exclusively for students preparing for medicine. Not open to Chemistry majors, and not accepted in place of the regular courses* in qualitative and quantitative analysis as prerequisites for advanced laboratory courses, with the exception of physiological chemistry for medical students.

[Students preparing for Medicine who have, however, already completed the regular course in Qualitative Analysis (6 and *b*), may register for *kb* for two hours credit.]

In 1915-16 the course *kb* must be begun by October 20th in the first semester and about March 1st in the second semester. The classes will be expected to finish *ka* by those dates. Course *k* (*a* and *b*) must be registered at the same time—for four units total credit. Either semester.

ka. Qualitative Analysis.—Brief course. Credit deferred until *kb* is also completed.

2 units (LENOX, BERGER)

kb. Quantitative Analysis.—Brief course.

2 units (SLOAN)

x. Advanced and Special Courses in laboratory work and research work are open to students who have completed the necessary prerequisites, by arrangement with professors of the Department, and with reference to the particular aims and ambitions of the students. Such advanced or special subjects are, for example: special methods in mineral analysis, iron and steel analysis; special methods in assaying water analysis; food analysis; urine analysis; elementary organic analysis; special organic preparations; analysis of sugar, toxicology, etc.

Qualified students may also pursue investigations of problems in inorganic, organic, physical, analytical, or physiological chemistry under the direction of any professor with whom arrangement is made.

For all such advanced, special, or research work, students will register and enroll under *x*, giving name of the professor under whom the work is to be carried on, and for such number of units of credit as may be agreed upon.

Candidates for the degree of Bachelor of Arts in Chemistry may select any one of the four following curricula (A, B, C, D), the requirements of the Department being as follows:

A. GENERAL CHEMISTRY

FIRST YEAR:—Chemistry 1, *a*; Physics 1; Mathematics 3; German 1.

SECOND YEAR:—Chemistry 2, 6, *b*; Mathematics 7 or 9; German 2*a* or 2*c*.

THIRD AND FOURTH YEARS:—Chemistry *d*, 3, *c*, 8, *f*; Mineralogy 2.

Recommended for all who are studying the science of chemistry for its own sake or for the profession of teaching.

B. ANALYTICAL CHEMISTRY

FIRST YEAR:—Chemistry 1, *a*; Physics 1; German 1.

SECOND YEAR:—Chemistry 2, 6, *b*; Geology 1; Economic Geology 1; German 2*a* or 2*c*.

THIRD AND FOURTH YEARS:—Chemistry *d*, *e*, *c*, *h*, 3, 10; Mineralogy 1; Metallurgy *a*.

Particularly adapted to students who are looking forward to the career of analytical chemist and assayer.

C. MEDICAL OR SANITARY CHEMISTRY

FIRST YEAR:—Chemistry 1, *a*; Physiology 1; German 1.

SECOND YEAR:—Chemistry 2, 6, *b*; Physics 7; German 2*a* or 2*c*.

THIRD AND FOURTH YEARS:—Chemistry 3, *c*, *d*, 11, *g*.

Particularly adapted to students who are looking forward to medical education or to sanitary chemistry.

D. CHEMICAL ENGINEERING

This curriculum comprises four years of the necessary five years' work leading to the advanced degree of *Engineer* in Chemical Engineering. Candidates in this course receive the degree of A. B. in Chemistry upon completion of the following requirements:

FIRST YEAR:—Chemistry 1, *a*; Applied Mathematics 1; German 1.

SECOND YEAR:—Chemistry 2, 6, *b*, *d*; Applied Mathematics 2, 3.

THIRD YEAR:—Chemistry 3, *c*; Engineering 1*a*, 1*b*, 2; Physics 1, 2 (or 6*a* and 6*b*); German 2*a* or 2*c*.

FOURTH YEAR:—Chemistry 4, *e* (or *h*); Mechanical Engineering 11, 13; Metallurgy 1; Engineering 3*a*.

Intended particularly for students who are working toward the degree of Chemical Engineer and who desire to fit themselves for positions of responsibility in connection with the administration of industries involving chemical knowledge and skill.

ADVANCED DEGREES

Applicants for the degree of MASTER OF ARTS in Chemistry will be expected to complete, in addition to the requirements for the bachelor's degree, the equivalent of thirty units' work in the University—of which approximately two-thirds must be in the Department. This work will include a thesis based on laboratory work, and Chemistry 8 and *f*, if not included in the undergraduate work.

Candidates for the advanced degree of ENGINEER in Chemical Engineering will be required to complete, in addition to the requirements for the A. B. degree specified under course D: Mechanical Engineering 14, 32, 24, 36, Chemistry 8, and a thesis based on laboratory work. Electrical Engineering 1 is advised, if possible, though not required. It is estimated that these requirements may be completed in one year after the completion of the requirements under Course D.

Candidates for the degree of DOCTOR OF PHILOSOPHY in Chemistry, after the completion of the equivalent of the requirements for Master of Arts or Engineer, will follow such courses as are approved by the Department faculty, subject to general University regulations.

The TEACHER'S RECOMMENDATION.—The minimum requirement for the high school teacher's recommendation in Chemistry is courses 1 and *a* (Elementary and General Inorganic, lectures and laboratory), the first half of course 2 (Principles of Chemistry), and either the second half of course 2, or courses 6 and *b* (Qualitative Analysis, lectures and laboratory).

LABORATORY FEES.—A charge of \$25 per semester will be made to students in each laboratory course of not more than four units registration. Of this charge \$10 per semester is returnable, less bills for breakage and loss of apparatus. A charge of \$15 will be made for Chemistry *h*, \$5 returnable, less breakage.

BOTANY

DOUGLAS HOUGHTON CAMPBELL, GEORGE JAMES PEIRCE, Professors.
LEROY ABRAMS, LEONAS LANCELOT BURLINGAME, Associate Professors.
JAMES IRA WILSON MCMURPHY, Instructor.

The Department of Botany aims to provide instruction for two classes of students: (*a*) Students who wish to know something of the structures, life processes, and relationships of plants, and to gain some familiarity with the methods of scientific work; and (*b*) Professional students who look forward to investigation, teaching, or the technical applications of Botany in Plant Breeding, Forestry, Agriculture, Horticulture, Plant Pathology, etc. Course 1, which presents the elements of the more important divisions of botanical study, is designed to meet the needs of both groups of students and must precede all other courses in the department, except in the case of students who have received entrance credit for its equivalent. Courses 2 to 12 are open to students who have had course 1 or its equivalent. It is the aim of these courses to give the student, by means of lectures and references to the literature, a general and summary account of the present state of knowledge, and in the laboratory and the field to afford him an opportunity for a personal acquaintance with plants themselves. Students who have had two or more years' work may, after consultation, be registered in courses 13, 14, 15, 16, 17. The resources of the department afford exceptional opportunity for investigation in a number of fields. Properly qualified students desiring to undertake such

investigation should register in courses 20, 21, or 22, after consultation with the instructor concerned.

Major students in the department will be expected to complete 34 units in the department, and Zoology 1. The thirty-four units should include courses 1, 2 or 4, 3, 5, 6, and 7 or 8. It is strongly recommended that courses 2 and 4 be taken in the second year.

The Teacher's Recommendation for High School Botany is based on a minimum of courses 1, 2 or 4, 5, 6, and 7 or 8.

Students looking to Forestry or Agriculture as a profession should include courses 5, 6, 7, 8, 11, 12, and 16, as part of their preparation, and the following subjects in other departments: elementary physics, chemistry, geology and physiography, zoology, entomology, economics, and applied mathematics. They should also be able to read French and German.

Fees are charged in the various courses approximately sufficient to cover the cost of the perishable materials and syllabus used, as follows: Courses 1, 2, 4, 5, 6, 11, 15, \$3.00 each; courses 3, 7, 8, 9, 13, 14, 16, 17, \$5.00 each.

1. Elementary Botany.—Study of representatives of the principal groups of plants, with lectures upon their morphology and classification; anatomy and physiology of seed plants. (Campbell's University Text-Book of Botany). Short botanical excursions will be made on five Saturdays in each semester. Attendance on these is not required, but is desirable, and will yield an additional half-unit per semester.

3 or 3½ units, both semesters (CAMPBELL, BURLINGAME, PEIRCE,
ABRAMS) Lec. W 1:30; Lab. MT or ThF 1:30

2. Algae.—Lectures, reading, and laboratory work upon the special morphology and classification of the Algae.

5 units, 1st semester (CAMPBELL)
Lec. W 2:30; Lab. MTThF 1:30-4:30

3. Fungi.—The laboratory work will be devoted to morphology, development, and culture methods; the lectures to systematic relationship, with an account of economically important forms.

3 units, 1st semester (McMURPHY)
Lec. T 8:15; Lab. TTh forenoons

4. Archegoniatae.—Special morphology and classification of the Archegoniatae. Continuation of course 2.

5 units, 2d semester (CAMPBELL)
Lec. W 2:30; Lab. MTThF 1:30-4:30

5. Spermatophytes.—A laboratory study of the anatomy and morphology of Seed Plants, with lectures on their evolution and classification.

3 units, 1st semester (BURLINGAME) [Not given in 1916-17.]

6. Classification of the Angiosperms.—Lectures, laboratory, and field work on the classification of the flowering plants.

3 units, 2d semester (ABRAMS)

Lec. W 1:30; Lab. MT 1:30-4:30

7. Physiology.—Laboratory work, lectures, and reading on Nutrition. (An elementary knowledge of physics and chemistry is a desirable preliminary to this course.)

3 units, 1st semester (PEIRCE) Lec. W 2:30; Lab. MT 1:30-4:30

8. Physiology.—Laboratory work, lectures, and reading on Respiration, Growth, Irritability, and Reproduction. (An elementary knowledge of physics and chemistry is a desirable preliminary to this course.)

3 units, 2d semester (PEIRCE) Lec. W 2:30; Lab. MT 1:30-4:30

9. Botanical Technique.—Lectures and laboratory work. The methods of killing, fixing, preserving, embedding, sectioning, staining, etc., will be taught in connection with the preparation of material for study in the course.

3 units, 2d semester (BURLINGAME)

[Not given in 1916-17: given 1917-18.]

10. Plant Breeding.—A series of lectures and assigned readings on the principles underlying modern practice in the propagation and improvement of plants. An elementary course in botany or its equivalent is a prerequisite.

1 unit, 1st semester (BURLINGAME)

11. Dendrology.—Lectures, laboratory, and field work on the trees and shrubs. Special attention will be given the Gymnosperms.

3 units, 1st semester (ABRAMS)

Lec. W 1:30; Lab. MT 1:30-4:30

12. Geographical Distribution.—Lectures and reading on the principles of the geographical distribution of plants and the floral regions of the world.

1 unit, 1st semester (CAMPBELL, ABRAMS)

[Not given in 1916-17.]

13. Cytology.—Lectures and laboratory work on the plant cell; the bearings of cytology on evolution, plant breeding, etc. (Open to

those who have had course 1. Courses 7 and 8 are desirable preliminaries.)

3 units, 2d semester (BURLINGAME) [Given in 1916-17.]

14. Archegoniatae.—Advanced work in special groups.

1st and 2d semesters (CAMPBELL) By arrangement

15. Taxonomy.—A critical study of some family or genus, or the flora of a region, with special reference to nomenclature and the methods of investigation. The laboratory and herbarium work will be supplemented by field work.

(ABRAMS) By arrangement, either semester

16. Plant Pathology.—Lectures, laboratory, and field work on the fungous and other plant diseases. Open only to students who have had course 3 or its equivalent.

3 units, 2d semester (McMURPHY)

Lec. T 8:15; Lab. TTh forenoons

17. Advanced Plant Pathology.—Field and laboratory work on special diseases.

1st and 2d semesters (McMURPHY) By arrangement

20. Research in Morphology.

(CAMPBELL, BURLINGAME)

21. Research in Physiology.

(PEIRCE)

22. Research in Taxonomy and Geographical Distribution.—Western America with its great diversity of climate and topography affords innumerable problems for investigation in taxonomy and plant distribution. The University collections, officially known as the Dudley Herbarium, are rich in material from this region and offer favorable facilities for the pursuit of studies along these lines. (ABRAMS)

PHYSIOLOGY AND HISTOLOGY

ERNEST GALE MARTIN, FRANK MACE MCFARLAND, Professors.

CLARA S. STOLTENBERG, Associate Professor.

JAMES ROLLIN SLONAKER, FRANK WALTER WEYMOUTH, Assistant Professors.

UNDERGRADUATE COURSES

1. General Anatomy and Physiology.—This course is designed to give a general view of the laws of the structure and the activity of

organisms. The work will give occasion to discuss many questions of General Biology. It consists of: First, the study of the cell and its activities as shown in the unicellular organisms, in reproductive cells, and in individual cells of many tissues; second, the study of the laws and course of development resulting in higher differentiations in structure, and specializations in function, exhibited in a selected series of organisms, both animals and plants, of increasing complexity; third, the comparative study of the physiological processes of forms placed under widely different conditions. The latter part of the course is occupied with an introduction to the embryology, anatomy, and physiology of vertebrates. (One lecture and five laboratory hours per week.)

3 units, both semesters (MARTIN, WEYMOUTH)

Lec. M 1:30; Lab. MT 1:30-4:30

2. Physiology of Muscle and Digestion.—To be preceded by courses 1 and 9 by majors in the Department. An experimental course covering the ground represented in Howell's Text-book on the same subjects. (Two lectures and five laboratory hours per week.)

4 units, 1st semester (MARTIN, SLONAKER)

Lec. TTh 8:15; Lab. MT or ThF 1:30-4

3. Physiology of Blood and Circulation, Respiration, Elimination of Wastes, Metabolism, and Nutrition.—Planned to follow course 2. An experimental course, covering the ground represented in Howell's Text-book. (Two lectures and five laboratory hours per week.)

4 units, 2d semester (MARTIN, SLONAKER)

Lec. TTh 8:15; Lab. MT or ThF 1:30-4

4. Anatomy and Histology of the Sense Organs.—Dissections, and study of prepared slides. Texts: Quain-Schäfer's Microscopic Anatomy, Quain's Sense Organs. One lecture and five laboratory hours per week. Prerequisites for courses 4 and 5 are courses 1 and 9, for majors in the Department.

3 units, 1st semester (STOLTENBERG)

Lec. W 8:15; Lab. MW 8:15-12:15, or MT 1:30-4

5. The Nervous System.—A study of the structure of the central nervous system of man by means of dissections and prepared slides, supplemented by dissections of central nervous system of other mammals. Text required: Villiger's Brain and Spinal Cord; supplementary texts: Barker's Nervous System, Edinger's Nervöse Centralorgane, Johnston's Nervous System of Vertebrates, Quain's Neurology,

Van Gehuchten's *Système Nerveux*. (One lecture and five laboratory hours per week.)

3 units, 2d semester (STOLTENBERG)

Lec. W 8:15; Lab. MW 8:15-12:15, or MT 1:30-4:30

6. Physiology of the Nervous System and Sense Organs.—An experimental course in these subjects, requiring courses 4 and 5 as preliminary. (One lecture and five laboratory hours per week.)

3 units, 2d semester (WEYMOUTH)

Lec. Th 1:30; Lab. ThF 1:30-4:30

8. Special Courses in Physiology.—Advanced courses open only to those who have had courses 1, 2, 3, 4, 5, and 6. They are arranged for the advanced study of selected subjects in physiology, or as a drill in the methods of research. The work will be planned for the individual student, the time varying with the exigencies of the case.

2 to 5 units, both semesters (MARTIN) By arrangement

9. Histology.—The study of the structure of the cell and its modes of reproduction, the epithelial, muscular, nervous, and connective tissues, and the outline of their development in a comparative way occupy the first semester. During the second semester the structure of the blood and lymph, and the microscopic anatomy of the organs are dealt with. Text required: Quain-Schäfer's *Microscopic Anatomy*. Elementary histological technique is taught during the course. In either semester a limited number of students may register for an extra unit, which is devoted to more extended histological technique. Prerequisite for course 9, course 1, or its equivalent. (One lecture and five laboratory hours per week.)

3 units, both semesters (McFARLAND)

Lec. Th 9:15; Lab. TTh 9:15-12:15

10. Histogenesis.—A course in advanced Histology for students who have completed courses 1 and 9, and in addition the first semester of Vertebrate Embryology (Zoology 11). It comprises the comparative study of the histogenesis of the fundamental vertebrate tissues and organs. (One lecture per week, minimum laboratory work six hours per week.)

3 units, 1st semester (McFARLAND)

Lab. MTW 1:30-4:30

11. Neurocytology.—A comparative study of the minute structure of the nerve cell and nerve fibre, the neurone theory, and the question of functional alterations of structure during normal activity and

artificial stimulation. (One lecture and at least six laboratory hours per week.) Open to advanced students.

3 to 5 units, 2d semester, in alternate years (McFARLAND)

[Not given in 1916-17.]

12. Cellular Biology.—A course in Cytology dealing with the structure and functions of the cell, with special reference to the reproductive processes in unicellular and multicellular organisms, and the theories connected therewith. Open to advanced students. (Two lectures per week, with demonstrations and laboratory work.)

3 to 5 units, 2d semester, in alternate years (McFARLAND)

MTW 1:30-4:30

13. Special Courses in Histology.—Advanced courses in Histology, Cytology, Microscopic Anatomy, and Microscopic Technique will be arranged for individual students, in accordance with their special needs. Open only to those who have had courses 1, 4, and 9.

2 to 5 units, both semesters (McFARLAND) By arrangement

14. Journal Club.—Students in the advanced classes will be expected to meet once a week to discuss current literature in Physiology and Histology.

1 unit, both semesters (Department FACULTY) By arrangement

15. Research in Physiology or Histology.

(MARTIN, McFARLAND, SLONAKER, STOLTENBERG, WEYMOUTH)

By arrangement

Candidates for the Bachelor's degree who select Physiology and Histology as a major will be expected to take courses 1, 2, 3, 4, 5, 6, 9, and 14, and at least five units to be made up from the other courses offered in the Departments of Physiology, Anatomy, or Bacteriology; and in addition courses 1 and a in Chemistry, one year in Physics (see course 7), and the first semester in Embryology (course 11 in Zoology). Candidates for the degree of M. D. will also include Organic Chemistry and courses in German or French sufficient to give a reading knowledge of the language.

LABORATORY UNIT OF CREDIT.—In those courses in which definite laboratory time is not fixed, three hours of laboratory work per week through one semester are taken as the equivalent of one unit of credit.

The TEACHER'S RECOMMENDATION.—Students who wish the Department recommendation for High School teaching in Physiology are expected to complete courses 1, 2, 3, and 9.

LABORATORY FEES.—\$5 per semester for each laboratory course.

GRADUATE COURSES

The graduate work of the Department is included in the courses 8, 10, 11, 12, 13, 14, and 15. Undergraduate students may elect such of these courses as they are prepared to take, but credit recorded in undergraduate standing will not count toward a higher degree. The details of the work of a graduate student will be planned for each individual, and will naturally depend on the aim sought by him and upon his previous training. Candidates for the higher degrees will be expected to include in their work attendance on the Journal Club and Seminary, the selection of certain of the courses given above, and the accomplishment of some research. When it is desired to select a minor subject, the choice of such minor will be guided by the needs of the candidate. The work leading to these degrees is of such a nature as to require a reading knowledge of German and French for its accomplishment.

PREPARATION FOR THE STUDY OF MEDICINE

Students intending to enter on the study of Medicine are advised to take Physiology and Histology as a major subject, with Chemistry, Physics, and Anatomy among the collateral subjects. Such a curriculum gives that foundation both in scientific knowledge and in skill in experimental Physiology, and in Histological and Anatomical technique, which will make it possible to accomplish the medical course of the best medical schools with the greatest advantage. The courses required for graduation in the Department of Physiology and Histology with the degree of A. B. include the premedical requirements and the work of the first year of the Medical Department of this University. For details of requirements for students intending to register in the Department of Medicine see the announcement of that Department.

ANATOMY

ARTHUR WILLIAM MEYER, Professor.

EDGAR DAVIDSON CONGDON, Assistant Professor.

REQUIRED COURSES

1. Osteology.—Students will be expected to familiarize themselves thoroughly, on their own initiative, with the surface anatomy of the bones of the skeleton. The laboratory work will be supplemented by

recitations and lectures dealing with the internal architecture, the development, growth, and regeneration of typical bones, their nutrition and innervation, the mechanics of the skeleton as a whole, and the changes it undergoes from birth to old age.

2 to 3 units, 1st semester (MEYER, CONGDON)

2-3-4. Dissection of (2) the Head, Neck, and Thorax; (3) the Upper Extremity; (4) the Abdomen and Lower Extremity.—These courses are given simultaneously throughout the year and may be begun at any time. No one will be assigned to less than one of the above parts nor will credit be given for less, save by special arrangement.

2 to 5 or more units (MEYER, CONGDON)

OPTIONAL AND ADVANCED COURSES

5. Topographical Anatomy.—The work consists of laboratory study of frozen sections of foetal, infantile, and adult cadavers made in various planes, and of dissected and specially injected preparations, supplemented by models and atlases. It is suggested that students who can afford the time supplement courses, 2, 3, and 4 by the respective portions of course 7 immediately on completing the dissection of a part. Open to students who have completed courses 1, 2, 3, and 4.

1 to 5 units (MEYER)

6. Morphogenesis.—Factors influencing animal form and structure are considered. Especial attention is given to man and mammals. Lectures.

1 unit, 1st semester (CONGDON)

By arrangement

7. Human Embryology.—This course will be offered as soon as adequate provision can be made. Course 11 in the Department of Zoology is a prerequisite. Elective.

8. Investigation and Special Work.—The facilities of the laboratory are always at the disposal of properly qualified students or physicians who desire to undertake the investigation of some problem in gross or microscopic anatomy or in embryology. Theses and special work must be arranged for individually, but may begin at any time.

REQUIREMENTS FOR ADVANCED DEGREES.—In addition to the requirements published in the University Register and the Announcement of the School of Medicine, students desiring to be admitted to candidacy for the degree of Master of Arts in Anatomy must have satisfactorily completed one year's work in histology and microscopic anatomy, at least one semester of embryology, and possess a knowledge of laboratory technique adequate for the investigation to be undertaken.

For admission to candidacy for the degree of Doctor of Philosophy a reading knowledge of both French and German is further required.

DEPOSIT FEES.—A deposit of \$10, to cover damage to or loss of bones, is required of all students in Anatomy. This sum, less charges for damage or loss, is refunded at the close of the academic year, except in the case of students discontinuing Anatomy, who may obtain the refund at the end of the first semester. Students of Anatomy who are not registered medical students are charged a fee of \$15 for each of courses 2, 3, and 4, and \$5 for courses 1 and 5.

Embryology.—Development of the chick through the first three days of incubation. [Course 11 in the Department of Zoology.]

2 units, 1st semester (PRICE)

BACTERIOLOGY AND IMMUNITY

WILFRED HAMILTON MANWARING, Professor.

HARRY JOHNSON SEARS, Instructor.

MARCUS CLAUDE TERRY, Clinical Instructor in Immunology.

[With the co-operation of Dr. MARCUS CLAUDE TERRY, United States Public Health Service, San Francisco; Dr. HAROLD F. GRAY, Health Officer, Palo Alto; and Instructor JAMES IRA WILSON McMURPHY, Department of Botany.]

1. General Bacteriology.—An introductory course dealing mainly with non-pathogenic forms. Prerequisites: 75 units of university work, including 6 units of biological science, Chemistry 3 (or 3a), and *d* (or *k*).

4 units, 2d semester (SEARS) Lec. Lab. TTh 9:15-12:15

2. Medical Bacteriology.—Required medical course. The course includes introductory lectures in Immunity and Bacteriological Chemistry. Prerequisites: 90 units of university work, including Physiology 2, 3, 9, Chemistry 3 (or 3a), *d* (or *k*), and course 1. The course must be preceded or accompanied by Chemistry 11 and *g*. (The course is open to graduate students and third-semester medical students who have not had course 1.)

7 units, 1st semester (MANWARING, SEARS)

Lec. MTW 8:15, F 3:30; Lab. M 9:15-11:15, T 9:15-12:15,
Th 1:30-3:30

2a. Animal Inoculations, Autopsies, Surgical Technique.—Elective. Laboratory exercises parallel with course 2.

1 unit, 1st semester (MANWARING) Lab. W 9:15-10:15, F 1:30-3:30

3. Immunity.—Prerequisites: Chemistry 11, *g*, Histological Technique, courses 2 and 2a.

8 units, 2 semester (MANWARING)

Lec. MWF 9:15; Lab. MTWThF 9:15-12:15

5. Seminary, Journal Club.—Prerequisites: course 2 and a reading knowledge of German.

2 units, either semester

6. Advanced Work, Medical Thesis, Research.

FEES—Course 1, \$15; course 2, \$20; course 2a, \$5; course 3, \$25. Microscope rental, \$3 per semester. Students pay for breakage and loss of apparatus.

MAJOR STUDENTS—*Required*: Physics 7; German 1, 2a; Chemistry 3 (or 3a), *d* (or *k*), 11, *g*; Physiology 2, 3, 9; Bacteriology 1, 2a, 3, and 5. *Recommended*: Botany 1; Zoology 1; Chemistry *b*, *c*, - (water analysis, food analysis).

PHYSICAL TRAINING

MEN

HERBERT ROWELL STOLZ, Assistant Professor of Physical Training and Personal Hygiene.

WILFRED HARRY MALONEY, ERNEST BRANDSTEN, Instructors.

It is the aim of the Department of Physical Training to afford the opportunity for pleasurable and beneficial exercise for the men of the University. The maintenance of the gymnasium and the swimming pool is dependent upon the student fees administered by the director and those who pay this fee should share in the responsibility of seeing that property which is kept up at their expense is not carelessly destroyed or damaged. On the other hand, thoughtful suggestions for the improvement of the gymnasium administration will always be welcomed and carefully considered.

LOCKERS.—Every man who has paid the gymnasium fee is entitled to a locker. A deposit of fifty cents is required on every key; the deposit is payable only at the Business Office. In the event of a key being lost a duplicate will be furnished at a cost of twenty-five cents. In case a key is mislaid or forgotten an assistant will open the locker with a pass-key but no duplicate key will be given out for temporary use.

TOWELS.—The payment of the gymnasium fee entitles the student to the use of towels. A ticket for the first towel may be obtained in the office and thereafter a used towel may be exchanged for a fresh one whenever the towel booths are open. Towels may only be obtained in person. In case the last towel is not returned the locker key deposit will not be refunded.

LIBRARY.—A library of books upon sport, hygiene, and physical training is maintained in the office and is available for the use of the men of the University. It is especially requested that the books be carefully handled and replaced upon the shelves. The books are not to be taken away from the library.

PHYSICAL TRAINING.—Beginning September, 1916, no university credit will be given for physical training. The aim will be to conduct regular exercises for organized classes and corrective exercises for individuals and to stimulate widespread interest in all forms of athletics. With the help of the associated students provision will be made for adequate instruction for individuals as well as for the various athletic teams.

ENROLLMENT.—Enrollment in physical training classes takes place from 9:00 a.m. till noon and from 2:00 p.m. till 6:00 p.m. on the Wednesday and Thursday following the first day of registration in each semester. The physical training is arranged upon a group system, each group containing one or more forms of exercise. The choice among these groups is only restricted by the student's inability to fit the prescribed exercise periods into his schedule of university work. Enrollment must be completed and a group finally selected within two weeks from the first day of each semester.

REGULATION GYMNASIUM SUIT.—Those who are enrolled in physical training are expected to report for exercise in the regulation gymnasium suit, which consists of white sleeveless cotton shirt; unbleached canvas running pants with belt straps; grey stockings; white gymnasium shoes.

SWIMMING POOL REGULATIONS.—The swimming pool has been constructed by the Board of Control for the Associated Students; the Board of Trustees has contributed toward the cost of the purification plant. The cost of equipment, maintenance, and instruction is met by the gymnasium fees.

Every man who has paid his student body dues is entitled to use the pool under the conditions decided upon by the Executive Committee of the Associated Students and the Director of Physical Training.

For the maintenance of a healthy pool it is absolutely necessary that all the men using it take a personal interest in its cleanliness. Any man who enters the pool while suffering from an infectious disease is endangering the health of all the users. Every man is expected to take a shower bath before entering the pool.

SWIMMING POOL SCHEDULE.—On week days the pool is reserved for class instruction as follows: 11:30 a.m. to 12 noon; 2:00 p.m. to 3:00 p.m.; 4:00 p.m. to 5:30 p.m.; at other hours during the week open from 9:00 a.m. until 5:00 p.m. on Saturday the pool is open to all members of the student body.

MEDICAL ADVICE.—As a part of his registration every student is required to keep the appointment which is given him for a medical examination. The object of this examination is to ascertain the general health of each man and to afford a basis for advice concerning exercise and study.

The medical adviser does not undertake the treatment of disease, but he stands ready at any time to help in the case of accident or minor injury and to advise with students concerning their health.

Special classes and individual instruction are given to those who require corrective exercises and who will co-operate in the work.

INSTRUCTION.—Expert instruction is offered in rugby football, soccer football, basketball, track athletics, swimming, boxing, fencing, wrestling, gymnastics, athletic dancing, and corrective exercises. Those who are interested in tennis, baseball, indoor soccer, floor hockey, and indoor baseball, are urged to co-operate in securing regular competitions in these games both within the University and with outside teams.

PHYSICAL TRAINING AND PERSONAL HYGIENE

ROBLE GYMNASIUM

CLELIA DUEL MOSHER, Assistant Professor and Director.

FLORENCE COTTEN BURRELL, ETTA L. PARIS, Instructors.

HARRY WILFRED MALONEY, Teacher of Fencing.

GRETA JOHANNSSEN, Life Saver and Teacher of Swimming.

INEZETTA HOLT, Gymnasium Assistant.

The aim of Roble Gymnasium, as a laboratory of personal hygiene is to improve the standard of physical health of the women and increase their mental and physical efficiency; to encourage the habit

of exercise; and to stimulate a widespread interest in physical activity of all kinds, especially in those forms which will be available to the women after leaving college. This will be accomplished by conducting organized classes, with instruction for individuals as well as for the various teams.

Every encouragement will be given, as heretofore, to women who wish to come to the Gymnasium or any of the out-of-door classes irregularly; but the hours chosen must not interfere with the progress of those who come regularly.

On Fridays special emphasis will be laid on the recreational side of Physical Training. Folk dancing, swimming, tennis, and games will be offered with special reference to those who care to come only once a week.

Dress: black bloomers with white middie blouse and rubber soled regulation gymnasium shoes are needed for classes in the gymnasium and athletic fields. Ballet slippers are needed for all dancing classes except the Friday folk dancing.

No university credit will be given for Physical Training I, beginning September, 1916.

1. **Physical Training and Personal Hygiene.**—Two or more hours per week, in the gymnasium or its open-air divisions.

Gymnastics, Elementary	MW 11:15
Gymnastics, Advanced	TTh 4:30
Dancing, Elementary Gymnastic	TTh 10:15, MW 4:00
Dancing, Intermediate	MW 4:00
Dancing, Advanced	TTh 11:15
Folk Dancing	F 11:15
Social Dancing	F 4:30
Fencing, Elementary	MWF 4:30
Fencing, Advanced	TTh 11:15
Swimming	MTWThF 10:15, 11:15, 4:30, 8 p.m.

SPORTS	1ST SEMESTER	2D SEMESTER
Baseball	MWTh 4:30	
Tennis, Elementary	TWF 11:15, TW 4:30	TWF 11:15, TW 4:30
Tennis, Advanced	MThF 11:15, 4:30	MThF 11:15, 4:30
Volley-ball and Field		
Sports	F 11:15, 4:30	F 11:15, 4:30
Basket-ball		MWTh 4:30
Boating		MWTh 11:15, 4:30

2. Personal Hygiene.—Two lectures per week. Open to all women students. Required of all women taking courses 3 to 6.

2 units, 2d semester (MOSHER) TTh 10:1

3. Physical Training Theory.—Open only to students who have had Elementary and Advanced Gymnastics, Personal Hygiene 2, Zoology 10, or Anatomy.

2 units, 1st semester (PARIS) TTh 3:3

4. Practice Teaching.—Two hours per week. Open to student who have had course 3.

1 unit, 2d semester (PARIS) TTh 3:3

5. The Theory and Teaching of Athletic Plays and Games.—Open only to students who have had one or more years of Physical Training 1, and Personal Hygiene 2.

2 hours, 2d semester (BURRELL) By arrangement

6. Supervision of Children's Play.—Three hours per week. Open only to students taking course 5.

1 unit, each semester (BURRELL)

Women who purpose attending later a School of Physical Training as preparation for being directors of Physical Training or supervisors of playground work, should take the subjects listed below in addition to the courses offered in this department. Such students will find advantageous to major in Zoology; if other majors are desired, students are requested to consult the Director.

ZOOLOGY.—I. Elementary. (3 units, both semesters)

4. The Vertebrates (field work). (2 units, both semesters)

8. Microscopical Anatomy. (2 units, 1st semester)

11. Embryology. (2 units, both semesters)

ANATOMY.—I. Osteology. (2 or 3 units, 1st semester)

2, 3, 4. Dissections of (2) Head, Neck, Thorax, (3) the Upper Extremity, (4) Lower Extremity and Abdomen. (2 to 5 units or more)

5. Topographical Anatomy.

PHYSIOLOGY.—2. Muscle and Digestion. (4 units, 1st semester)

3. Blood and Circulation, Respiration, Elimination of Wastes, Metabolism, and Nutrition. (4 units, 2d semester)

PSYCHOLOGY.—I. Elementary Psychology. (4 units, 1st semester)

BOTANY.—II. Field Botany. (1 unit, both semesters)

ENTOMOLOGY.—I. Elementary. (3 units, either semester)

ENGLISH.—Vocal Expression. (3 units, either semester)

ECONOMICS.—1. Elements. (3 units, both semesters)

MECHANICAL ENGINEERING.—5. Woodworking.

(2 exercises a week, one semester)

ZOOLOGY

CHARLES HENRY GILBERT, HAROLD HEATH, GEORGE CLINTON PRICE,
Professors.

JOHN OTTERBEIN SNYDER, Associate Professor.

EDWIN CHAPIN STARKS, WALTER KENRICK FISHER, Assistant Professors.

[Courses 1, 2, 3, and 4 may be undertaken without previous preparation in Zoology.]

1. Elementary Zoology.—A laboratory course involving the study of representatives of the principal groups of animals, accompanied by lectures on their structure and classification, and on the general laws of biology which they illustrate.

3 units, both semesters (PRICE, STARKS)

Lec. M 1:30; Lab. MT 1:30-4:30

2. Animal Forms.—An introduction to the facts and principles of animal biology; structure, function, and interrelations of animal forms; the simpler and best established generalizations in zoological theory.

3 units, 2d semester (FISHER)

Lec. by arrangement; Lab. ThF 1:30-4:30

3. Animal Life.—A consideration of the general principles of biology based on a study of the behavior, environment, structure, and relationships of the simpler fresh-water organisms. This course will be useful to students who intend to teach where marine material is not available.

2 units, 1st semester (FISHER)

Lec. by arrangement; Lab. MT 1:30-4:30

4. The Vertebrates.—A general course in the classification of vertebrate animals, with studies in their habits and the geographical distribution of species. The course will include field excursions and a study of the methods of collecting and preserving specimens.

2 units, both semesters (SNYDER) Lec. Th 2:30; Lab. ThF 1:30-4:30

5. The Invertebrates.—This course, following course 1 or 2, is designed to give the student a broader knowledge of the morphology and relationships of the more important invertebrate groups.

3 units, both semesters (HEATH)

Lec. by arrangement; Lab. MT 1:30-4:

6. Invertebrate Embryology.—A study of segmentation, the formation of the germ layers, and certain phases of the later development including the significance of larval forms and the relationships of the principal phyla. Must be preceded by courses 1 or 2, and 5.

2 units, both semesters (beginning 2d semester) (HEATH)

7. Advanced Work on Invertebrates.—The original investigation problems connected with the anatomy and embryology of invertebrates.

3 to 5 units, both semesters (HEATH)

8. Microscopical Anatomy.—A study of the fundamental animal tissues, with drill in microscopical technique.

2 units, 1st semester (HEATH)

9. Special Systematic Work on Invertebrates.—Original investigation of problems connected with the classification of invertebrates.

2 or 3 units, both semesters (FISHER) By arrangement

10. Comparative Anatomy of the Vertebrates.—A detailed examination of vertebrate morphology, including dissection of representatives of the several classes of vertebrates, with comparative studies in vertebrate osteology, the nervous and circulatory systems.

3 units, both semesters (SNYDER) Lab. MTW 1:30-4:

11. Vertebrate Embryology.—First semester: development of the chick through the first three days of incubation. In the first semester students may register for an additional unit, to be devoted to embryological technique. Second semester: the early stages in the development of the salamander and the later stages in the development of the mammal.

2 units, both semesters (PRICE, FISHER)

Lec. Th 1:30; Lab. ThF 1:30-4:

12. Primitive Chordates.—Amphioxus, the tunicates, and the lampreys.

3 units, 1st semester (GILBERT) Morning hours, by arrangement

13. Fishes.—An examination of the larger groups of fishes and practical work in the discrimination of species.

3 units, 2d semester (GILBERT) Morning hours, by arrangement

14. Advanced Ichthyology.—Special problems in the morphology and classification of fishes will be set for advanced students prepared for such work.

2 to 5 units, both semesters (GILBERT) By arrangement

15. Comparative Osteology of the Lower Vertebrates.—A course for advanced students in the osteology and relationships of the lower vertebrates, to be arranged either as a general course, or as an intensive study of a few related forms.

2 or 3 units, both semesters (STARKS) By arrangement

16. Journal Club.—Open to seniors and graduate students.

2 units, both semesters (GILBERT) By arrangement

Major students must before graduation complete courses 1, 4, 5, 8, 10, 12, 13, 16, the first semester of courses 6 and 11, one advanced course in Zoology, and course 1 in Botany.

Work for graduate and special students will be laid out in accordance with their individual needs and preferences.

Students who look forward to the study of medicine may take Zoology for their major subject and receive the A. B. degree at the close of a four years' course which shall also contain the first year in medicine. The following courses in Zoology will be required of such students: Zoology 1 or 2, 6 units; the Invertebrates, 6 units; Comparative Anatomy, 6 units; Embryology, 4 units; Journal Club, 4 units.

The TEACHER'S RECOMMENDATION.—The Department recommendation for High School teaching in Zoology requires the completion of the following subjects: Zoology 1 or 2, 6 units; the Invertebrates, 6 units; the Vertebrates, 4 units; Comparative Anatomy of the Vertebrates, 6 units.

THE ZOOLOGICAL COLLECTIONS

The ZOOLOGICAL MUSEUM contains a very full representation of the fishes of North America, and includes among others a valuable series of the deep-water fishes of the Pacific, and large collections from the West Indies, the Hawaiian Islands, Bering Sea, Japan, the coasts of Mexico and Central America, and the Galapagos Islands. The museum contains also a large representation of the reptiles, batrachians, birds, and mammals of California and adjoining States. The collection of marine invertebrates is rich in Pacific echinoderms and crustacea, and contains a good working nucleus in the other principal groups. The series of deep-sea forms is especially valuable.

LABORATORY FEES.—All laboratory courses, \$3 each per semester.

ENTOMOLOGY AND BIONOMICS

VERNON LYMAN KELLOGG, Professor.

RENNIE WILBUR DOANE, Associate Professor.

MARY ISABEL MCCrackEN, Assistant Professor.

GORDON FLOYD FERRIS, Assistant.

ENTOMOLOGY

1. Elementary Entomology.—The elementary study of insect structure, development, and classification, including practice in collecting and preserving specimens. A preparatory study of the subject of entomology. Laboratory and field work.

3 units, either semester (McCracken) Any forenoon hours.

2. Morphology and Physiology of Insects.—A study of the metamorphosis, comparative morphology, and special physiology of insects.

3 units, either semester (McCracken) Any forenoon hours.

3. The Honey-bee and Apiculture.—A study of the structure and habits of the honey-bee, and of the methods of bee-keeping.

2 units, 2d semester (McCracken) Hours by arrangement

4. Economic Entomology: Coccidae (the Scale Insects).—A study of the classification, general biology, and economic relations of the scale insects, with particular attention to the more important injurious ones of the Pacific Coast. Field, laboratory, and bibliographic work, with occasional lectures. Must be preceded by courses 1 and 2.

2 or 3 units, either semester (Doane)

Any three afternoons, 1:30-4:30

5. Economic Entomology: Forest Insects.—A study of the insect enemies of forest and shade trees. The course includes field, laboratory, and bibliographic work. Should be preceded by course 4.

3 units, 1st semester (Doane) MWF 1:30-4:30

6. Economic Entomology: Orchard and Garden Insects.—A study of the principal injurious and beneficial insects of the orchard and garden. Includes field, laboratory, and bibliographic work, and a weekly lecture on the history, principles, and practice of economic entomology. Should be preceded by course 4.

3 units, 2d semester (Doane) MWF 1:30-4:30

7. Economic Entomology: Advanced Work.—Studies of one or more groups of insects of economic importance, including systematic ecological investigations, and methods of controlling the injurious spe-

cies. Field, laboratory, and library work, with occasional lectures. Intended for students fitting themselves for practical work in Economic Entomology. Open to advanced students by arrangement.

3 to 5 units, both semesters (DOANE)

8. Insects and Disease.—A discussion of the insects that cause or disseminate some of the diseases in man and the domestic animals. Lectures and demonstrations. Open to students having some previous training in biology.

2 units, 2d semester (DOANE)

Lec. TTh 9:15

9. Classification of Insects.—A study of the classification of insects, and the literature of systematic entomology. Field and laboratory work.

4 units, either semester (McCRACKEN)

By arrangement

10. General Entomology and Insect Adaptations.—A course of lectures and demonstrations. Open to students who have had some work in biology.

2 units, 1st semester (KELLOGG)

Lec. TTh 9:15

11. Insect Histology and Histologic Technic.—The study of the histology of insect tissues and organs, and the special methods of such study.

2 or 3 units, 1st semester (KELLOGG)

Hours by arrangement

12. Advanced Work.—Advanced study and investigation of the biology of insects. Laboratory and field work.

2 to 5 units, both semesters (KELLOGG)

By arrangement

BIONOMICS

13. Organic Evolution.—Lectures on the laws or principles of biology and the factors in organic evolution. Not open to first- and second-year students.

2 units, 2d semester (KELLOGG)

MWF 10:15

14. Heredity.—A discussion of the modern knowledge of heredity with special reference to human inheritance. Not open to first- and second-year students.

2 units, 2d semester (KELLOGG)

TTh 10:15

Work for graduate and special students will be specially arranged.

Major students in Entomology must obtain before graduation thirty units of credit in Entomology, and credit for course 1 in Zoology, and course 1 in Botany.

The ENTOMOLOGICAL COLLECTIONS contain authoritatively determined specimens, accessible for comparison, in all of the insect orders, and include many sets of specimens illustrating the development and habits of insects. There is included, also, the most important existing collection of North American Mallophaga, comprising the types of four-fifths of all the species so far described from North America and the Pacific Islands, an unusually large collection of Coccidae (scale insects), and valuable series of specimens from the Galapagos Islands, Samoa, and the Philippine Islands.

LABORATORY FEES.—\$3 per semester for each laboratory course. A returnable deposit of \$2.50 for microscope lenses and locker is required.

GEOLOGY AND MINING

GEOLOGY AND PALEONTOLOGY

BAILEY WILLIS (Geology), JAMES PERRIN SMITH (Paleontology),
Professors.

AUSTIN FLINT ROGERS (Mineralogy), CYRUS FISHER TOLMAN, JR.,
(Economic Geology), Associate Professors.

MINING AND METALLURGY

DAVID MORRIL FOLSOM (Mining), GALEN HOWELL CLEVINGER (Metallurgy), Associate Professors.

HAYES WILSON YOUNG (Metallurgy), Assistant Professor.

VALENTINE RICHARD GARFIAS (Petroleum Technology), Instructor.

Students intending to pursue their major subject in the Department of Geology and Mining should offer as a part of their entrance preparation solid geometry, trigonometry, advanced algebra, physics, and chemistry; otherwise the mathematics, physics, and chemistry must be taken in the University.

Courses of study in the Department of Geology and Mining lead to the degree of Bachelor of Arts on completing four years of study, or the equivalent of one hundred and twenty units of credit. The degree of Engineer is given in Mining or Metallurgy on completion of an additional year, or the equivalent of thirty additional units of credit, including a thesis. Or the degree of Master of Arts may be secured at the close of the fifth year's work, including a thesis, in accordance with the regulations of the University (Register p. 82). The degree of Doctor of Philosophy is given on completion of the required additional

work under the conditions stated in the Register (p. 84). The requirement that the work shall be done in residence may in part be waived on recommendation of the department when the needs of original investigation cannot be met at the University.

COURSES OF STUDY

The following is a list of the studies offered in the department. They are grouped under the heads of Geology, Mineralogy, Economic Geology, Paleontology, Mining, and Metallurgy. Certain elementary courses in the department are required of all students, as indicated: Geography 1, or Geology 1; Geology 2, 3; Economic Geology 1; Mineralogy 1; Paleontology 2. Other courses are elective, except that no study may be taken without proper preparation, and should be selected only after conference with the instructors. At least forty units of work in the department will be required for the degree of Bachelor of Arts of all students intending to follow the profession of geology and mining.

GEOLOGY

Geography 1: Physical Geography.—A lecture course on the aspects of the earth, treating of the facts, causes, and laws of physical geography; intended to give the student a knowledge of the physical world as the abode of man. Given in alternate years in lieu of Geology 1; required of all majors in Geology and Mining, unless they have had Geology 1; open to students from any other department.

3 units, 1st semester (1916-17) (WILLIS) MWF 8:15

Geology 1: Elementary Geology.—A lecture course on elementary geology, comprising a discussion of the phenomena and processes of geologic changes and an outline of geologic history; given in alternate years in place of Geography 1. Designed to constitute an introduction to all other courses in the department, and required of all majors who have not had Geography 1; open to students from any other department.

3 units, 1st semester (1917-18) (WILLIS) MWF 8:15

2. Supplement.—A seminar course, consisting of lectures, reading, thesis, and discussions on physical geography or elementary geology, in alternate years; designed to supplement Geology 1 or Geography 1, whichever is given in the same year, in order that the students who are majors in the department may be prepared in the elements of geography and geology to go on to the succeeding courses; required

of all majors in the department; open to students of other departments only by special arrangement.

1 unit, 1st semester (1916-17) (WILLIS) F 9:15

3. Field Excursions.—Elementary practice in geological observation as illustrated by the local facts of the geology within reach from the University. Required of Geology and Mining majors and open only to them, except by special arrangement.

2 units, 1st semester (WILLIS, TOLMAN) Saturday forenoons

4. Structural Geology.—Advanced work in the structure of stratified, massive, and foliated rocks. Open only to students who have had Geology 1 to 3 inclusive and Mineralogy 1.

2 units, 2d semester (WILLIS) TTh 9:15

5. Field Geology.—Field practice in working out geology in the field and its representation upon topographic maps and sections. Prerequisites: Geology 1, 2, 3, 4, Mineralogy 1, and Civil Engineering 4a. Students not majoring in the department may omit Geology 3 and 4.

5 units, summer vacation (WILLIS, TOLMAN)

6. Topographic Geology.—Field and laboratory work, with the construction of geologic maps and sections. Open to students who have completed course 5 in Geology.

4 units, summer vacation (WILLIS, TOLMAN)

7. Regional Geology.—Lectures and reading, with discussions in seminar, on the geologic provinces of North America and other continents.

(WILLIS)

By arrangement

8. Advanced Geology.—Reading and research work for advanced students in geology.

(WILLIS)

By arrangement

MINERALOGY

Mineralogy 1: Common Minerals and Rocks.—The study of the more common minerals and prominent rock types. An elementary course with emphasis upon sight determination and simple physical and chemical properties. Introductory to the other courses in mineralogy and petrography. Open to students who have had Chemistry 1 and a. Required of all Geology and Mining students, and open to a limited number of other students in order of application.

3 units, 2d semester (ROGERS, HAWLEY)

Lec. TTh 11:15; Lab. T 1:30-4:30

2. Crystallography.—An elementary study of the geometrical and optical properties of crystals and of the polarizing microscope as an instrument of research. This course is intended primarily as a pre-requisite for course 3, but may also be taken independently by chemistry and physics students as an introduction to the study of the solid state.

3 units, 1st semester (ROGERS)

Lec. TTh 11:15; Lab. T 1:30-4:30

3. Systematic Mineralogy.—Systematic study of the important minerals and their determination by all available methods. Mineralogy 1 and 2 (Crystallography) and Chemistry 6 and 6b are prerequisites.

3 units, 2d semester (ROGERS)

Lec. W 11:15; Lab. WF 1:30-4:30

4. Petrography.—Study of hand specimens and thin sections of the principal rock types and mineral deposits. In course 3 the properties or characters of minerals are considered, while course 4 is primarily concerned with the relations between associated minerals with special reference to their occurrence and origin. Preparation and study of polished ore sections will be under the direction of Professor TOLMAN. Mineralogy 2 and 3 are prerequisites.

5 units, 1st semester (ROGERS)

Lec. WF 11:15; Lab. WF and one period by arrangement, 1:30-4:30

5. Advanced Mineralogy.—Advanced work in crystallography, mineralogy, or petrography may be undertaken by properly prepared students.

2 to 5 units, either semester (ROGERS) By appointment

ECONOMIC GEOLOGY

Economic Geology 1: Mineral Resources.—A lecture course on the mineral resources of the world, their distribution, mode of occurrence and utilization; designed as an introduction to economic geology; required of all students majoring in the department, and open to students from any other department; should be preceded by Geography 1 or Geology 1 and (for majors in the department) by Geology 2, but any student will be accepted on recommendation of his major professor.

2 units, second semester (WILLIS) TTh 8:15

2. Non-metals.—The occurrence, distribution, origin, and geologic methods of investigation of the non-metallic substances. Prerequisite, Mineralogy 1.

3 units, 1st semester (TOLMAN) MWF 8:15

3. Ores.—The ore-forming processes, modes of occurrence of the various types of ore bodies, and the structures of the ores. The geologic study of the metallization of the important mineral-bearing provinces of the world and especially of the United States, and the description of the important ore deposits typical of each province. Open to students who have completed or are taking Mineralogy I.

3 units, 2d semester (TOLMAN) MWF 8:15

4. Seminar in Ore Deposits.—A review of the literature of ore deposits and the bearing of the data collected upon the problems of ore formation. Prerequisite, Mineralogy 4. (For seniors and graduate students.)

3 units, 2d semester (TOLMAN) By arrangement

5. Special Courses.—These include: (a) a study of the literature of some special phase of economic geology, with a thesis; (b) field investigations of some mine or mineral district, or the general economic geology of an assigned area; (c) microscopic studies of ores collected during field studies, or microscopic investigation of suites of specimens owned by the University. (For graduate students; in exceptional cases seniors will be admitted.)

(TOLMAN) By arrangement

PALEONTOLOGY

Paleontology 1: Systematic Paleontology.—History and character of fossils. Three lectures and six hours of laboratory work weekly.

4 units, 1st semester (SMITH) MWF 11:15

2. Historical Geology.—History and character of geologic formations. Three lectures and six hours' laboratory work weekly.

4 units, 2d semester (SMITH) MWF 11:15

3. Systematic Conchology.—Special studies in Tertiary and Recent Conchology of the West Coast. One lecture and two afternoons of laboratory work weekly.

2 units, both semesters (SMITH) TTh 1:30-4:30

4. Stratigraphic History of the Great Basin.

2 units, 1st semester (SMITH) TTh 10:15

5. Stratigraphy and Geologic History of California.

2 units, 2d semester (SMITH) TTh 10:15

6. Advanced Paleontology.—Original investigation of various problems in paleontology, especially of invertebrate morphology, and of the distribution of faunas. This course will consist entirely of private

work, in field and laboratory. Open to advanced students and graduates.

2 to 5 units, both semesters (SMITH) By arrangement

MINING

Mining 1: Mining Excavation.—Lectures and assigned reading on explosives and drills, and on methods of earth, rock, and ore excavation, including shaft sinking and tunneling. Prerequisites: Geology 1, Mineralogy 1.

2 units, 1st semester (FOLSOM) TTh 10:15

2. Ore Dressing.—Crushing and concentrating machinery and methods.

2 units, 2d semester (FOLSOM) TTh 8:15

3. Mining Methods.—Prospecting, development, and mining methods. Prerequisites: Economic Geology 2 and 3; Mining 1.

*2 to 3 units, 1st semester (FOLSOM) MW 8:15

4. Mining Machinery.—Lectures and assigned reading on the development and adaptation of power for mining purposes. Air compressors, pumps, hoists, and ventilating machinery. Mechanical handling of ore. Prerequisite for Mining students, Applied Mathematics 3.

*2 to 3 units, 2d semester (FOLSOM) MW 8:15

5. Petroleum Technology.—A general survey of the various problems involved in the exploitation of oil deposits.

3 units, 1st semester (GARFIAS) MWF 9:15

6. Petroleum Technology.—Detailed work on typical problems related to the various branches of petroleum engineering. Prerequisite, Mining 5. Students from other departments may register by permission of the instructor.

2 to 3 units, 2d semester (GARFIAS) By arrangement

7. Mine Engineering.—Lectures and assigned reading on general engineering and economic problems in connection with mining operations.

2 to 5 units, either semester (FOLSOM) By arrangement

8. Summer Mining.—Students will be given credit for two months' systematic work in the mining districts, or in the oil fields, under conditions satisfactory to the department.

4 units

*Students in Geology and Mining will register for three units in Mining 3 and 4. Students from other departments will register for two units.

METALLURGY

LECTURE COURSES

Metallurgy 1: Metallurgy of Constructive Materials.—Lectures upon the manufacture and properties of iron and steel and, to a less extent, the other alloys used in engineering. Open to students who have completed Chemistry 1.

2 units, 1st semester (CLEVINGER) TTh 8:15

2. Hydro-Metallurgy of Gold and Silver.—Lectures upon the general principles of hydro-metallurgical practice, with particular reference to the cyanide process. The older and now obsolete processes of chlorination, hyposulphite lixiviation, patio and pan amalgamation, etc., are referred to very briefly. Open to students who have completed Chemistry 1 and a. Prerequisite of Metallurgy c.

2 units, 1st semester (CLEVINGER) TTh 9:15

3. General Metallurgy.—Lectures upon the general principles of metallurgy, the fundamental chemical reactions, fuels, refractory materials, pyrometry, and alloys. The minor metals are dealt with briefly in this course. Open to students who have completed Chemistry 1 and a.

3 units, 1st semester (YOUNG) MWF 10:15

4. Metallurgy of Lead.—Lectures upon lead smelting, refining of base bullion, the pyrometallurgy of gold and silver insofar as it is inseparable from that of lead, parting and electrolytic refining of Dore bullion. Open to students who have completed Chemistry 1 and a, and Metallurgy 3.

2 units, 2d semester (YOUNG) ThF 10:15

5. Metallurgy of Copper.—Lectures upon the smelting of copper ores, converting, electrolytic refining, and a brief discussion of the hydrometallurgy of copper. Open to students who have completed Chemistry 1 and a, and Metallurgy 3.

2 units, 2d semester (CLEVINGER) TW 10:15

LABORATORY COURSES

a. Assaying.—The determination of gold, silver, and lead in ores and metallurgical products by fire assay. Open to students who have completed Chemistry 1 and a.

2 or 3 units, either semester (CLEVINGER, YOUNG) MTW

b. **General Metallurgy.**—Laboratory work on the standardization and use of various types of pyrometers, and the metallographic study of a limited number of metals and alloys.

2 units, 2d semester (YOUNG)

TF 1:30

c. **Metallurgy of Gold and Silver.**—This course involves the investigation and the making of a report upon the possible treatment of a gold or silver ore by the cyanide process. Open to students who have completed Chemistry *d* and Metallurgy 2 and *a*.

3 to 5 units, 2d semester (YOUNG)

MTWThF 1:30

d. **Flotation.**—This course involves the investigation and the making of a report upon the possible treatment of an ore by flotation. Open to students who have completed Chemistry *d*, Metallurgy *a*, and Mining 2.

3 to 5 units, 1st semester (CLEVINGER, YOUNG)

MTWThF

e. **Metallurgical Research.**—Properly qualified students may take up any subject of metallurgical investigation in the laboratory and, under proper restrictions, certain investigations may be carried on in the field. Also work in bibliography.

2 to 8 units, either semester (CLEVINGER) 1:30, by arrangement

CURRICULA

After a four years' course, or 120 units of work, the degree of A. B. may be secured. A student may propose to specialize in geology, mineralogy, economic geology, paleontology, mining, or metallurgy, and should select the studies indicated by the + in the corresponding column. The arrangement of courses by years indicates the order in which they should be taken, but does not imply that any course must be taken in a certain year.

The degree of A. B. may also be secured by a course of studies covering 120 units selected with a view to a liberal education in science, as a preparation for a career in business or non-scientific professional work. Students proposing such a course should determine to supplement it by one or two years of additional preparation for their life work. The election of studies will be directed by the major professor.

During the fifth year candidates for the degree of A. M. or Engineer of Mines or Metallurgy will pursue such courses as may be required to fill out any omissions of previous years, or such as may be recommended by the instructor in the particular branch of professional work.

**COURSES OF STUDY RECOMMENDED TO GRADUATE IN GEOLOGY, MINERALOGY,
ECONOMIC GEOLOGY, PALEONTOLOGY, MINING, OR METALLURGY.**

		STUDIES	Units	Geology	Mineral- ogy	Econ. Geol.	Paleon- tology	Mining	Metall- urgy
FIRST YEAR	FIRST SEM.	Geology 1 or Geography 1.....	3	+	+	+	+	+	+
		Geology 2	1	+	+	+	+	+	+
		English 2	2	+	+	+	+	+	+
		Engineering 1a & 1b.....	2	+	+	+	+	+	+
		Chemistry 1	2	+	+	+	+	+	+
		Applied Mathematics 1	5	+	+	+	+	+	+
	SEC. SEM.	Economic Geology 1	2	+	+	+	+	+	+
		Physics 1	4	+	+	+	+	+	+
		Applied Mathematics 1	5	+	+	+	+	+	+
		Chemistry 1 & a.....	4	+	+	+	+	+	+
		English 2	2	+	+	+	+	+	+
SECOND YEAR	FIRST SEMESTER	Geology 3	2	+	+	+	+	+	+
		Paleontology 1	4	+	..	..	+	..	..
		Chemistry 6 & b.....	4	+	+	+	+	+	+
		Applied Mathematics 2.....	3	..	..	..	..	+	..
		" " 3.....	5	..	..	..	..	+	..
	SECOND SEMESTER	Metallurgy 1	2	..	..	+	..	+	+
		" 2	2	..	..	+	..	+	+
		French 1 or German 1.....	3-5	+	+	+	+	..	+
		Paleontology 2	4	+	+	+	+	..	..
		Chemistry d	3-4	+	+	+	+	+	+
THIRD YEAR	FIRST SEMESTER	Mineralogy 1	3	+	+	+	+	+	+
		Applied Mathematics 2.....	3	..	..	..	..	+	..
		" " 3.....	5	..	..	..	..	+	..
		English 23	2	+	+	+	+	+	+
		French 1 or German 1.....	5	+	+	+	+	..	+
	SECOND SEMESTER	Mechanical Engineering 11.....	2	..	..	..	..	+	+
		Economic Geology 2	3	+	+	+	..	+	..
		Paleontology 3	2	..	..	..	+	..	..
		" 4	2	+	..	+	+	..	..
		Mineralogy 2	3	+	+	+	+	..	..
THIRD YEAR	FIRST SEMESTER	Civil Engineering 4a.....	5	+	+	+	+	+	+
		Engineering 2	5	..	..	..	..	+	..
		Mining 1	2	..	..	+	..	+	+
		" 3	3	..	..	..	..	+	+
		Metallurgy 3	3	..	..	..	..	+	+
	SECOND SEMESTER	Chemistry 2	3	..	+	+	..	..	+
		French 1 or German 1.....	3-5	+	+	+	+	..	..
		Spanish 1	3	+	..	+	..	+	..

STUDIES		Units	Geology	Mineralogy	Econ. Geol.	Paleontology	Mining	Metallurgy
THIRD YEAR SECOND SEMESTER	Economic Geology 3	3	+	+	+	..	+	+
	Geology 4	2	+	+	+	+	+	..
	Mining 2	2	..	..	..	..	+	+
	Paleontology 5	2	+	..	..	+	..	..
	Mineralogy 3	3	+	+	+	+	..	..
	Metallurgy 4	2	..	..	..	..	+	+
	" 5	2	..	..	..	..	+	+
	" a	3	..	..	..	..	+	+
	Chemistry 2	3	..	+	+	..	..	+
	" 10	2	..	..	..	..	..	+
THIRD YEAR FIRST SEMESTER	Geology 5 & 6.....	9	+	+	+	+	+	..
	French 1 or German 1.....	3-5	+	+	+	+	..	..
	Spanish 1	3	+	..	+	..	+	..
	Geology 7 .....	..	+	..	+	+	..	..
	Geology 8 .....	..	+	..	..	..	..	..
	Paleontology 6	2-5	..	..	..	+	..	..
	Mineralogy 4	5	+	+	+	+	..	..
	Economic Geology 5 .....	..	..	+	+	..	..	..
	Mining 3	3	..	..	..	..	+	..
	" 5	3	..	..	..	..	+	..
FOURTH YEAR FIRST SEMESTER	" 7	2-5	..	..	..	..	+	..
	Metallurgy d	3-5	..	..	..	..	+	+
	" e	2-8	..	..	..	..	..	+
	Chemistry 8	3	..	+	+	..	..	..
	" e	4	..	+	..	..	..	..
	Mechanical Engineering 24.....	2	..	..	..	..	..	+
	" " 1a.....	3	..	..	..	..	..	+
	Geology 7 .....	..	+	..	+	..	..	..
	" 8 .....	..	+	..	..	..	..	..
	Paleontology 6	2-5	..	..	..	+	..	..
FOURTH YEAR SECOND SEMESTER	Mineralogy 5	2-5	..	+	..	..	..	..
	Economic Geology 4.....	3	..	+	+	..	..	..
	" " 5.....	..	..	+	+	..	..	..
	Mining 4	3	..	..	..	..	+	+
	" 6	3	..	..	..	..	..	..
	" 7	2-5	..	..	..	..	+	..
	Metallurgy b or c	3	..	..	..	..	+	+
	" d	2-8	..	..	..	..	..	+
	Chemistry 8	3	..	+	+	..	..	..
	" e	4	..	+	..	..	..	..
FOURTH YEAR THIRD SEMESTER	Electrical Engineering 1	4	..	..	..	..	+	+

ENGINEERING

A. ENTRANCE SUBJECTS

Entering students whose major work is to be in any engineering department should be thoroughly prepared in elementary mathematics, and should have entrance credit in algebra (at least one and one-half units), plane and solid geometry, and plane trigonometry, in order to be able to take the first year's work in Applied Mathematics for engineers.

B. GENERAL COURSES

I. APPLIED MATHEMATICS

FIRST YEAR—Course 1 in Applied Mathematics.

SECOND YEAR—Courses 2 and 3 in Applied Mathematics. (See announcement of Department of Applied Mathematics, pp. 163-166.)

II. GENERAL TECHNICAL COURSES

1a. Linear Drawing and Lettering.—(Drafting one afternoon a week, either semester.) Open to all students, and required of those whose major subject is in any of the engineering departments, whether or not they have received entrance credit in mechanical drawing. This requirement is waived, however, for a student who satisfies the instructor that he has had the equivalent of this course, by submitting work in linear drawing and freehand lettering, or by passing a special examination. The instruments and materials for this course cost from twenty to thirty dollars.

1 unit, either semester (Foss) MT or ThF 1:30-4:30

1b. Descriptive Geometry.—Including applications to shades, shadows, and perspective. (One afternoon of drafting each week, first semester. Two lectures and two afternoons of drafting each week, second semester.) This course is open to students who have completed or who are taking Solid Geometry and Engineering 1a, and is required of students whose major subject is Civil or Mechanical Engineering.

1 unit, 1st semester; 4 units, 2d semester (Foss)

Lec. TTh 8:15, 10:15; Dft. MT or ThF 1:30-4:30

1c. Descriptive Geometry.—Course 1b abridged to meet the requirements of students having Geology and Mining as a major subject. Special preparation for problems arising in Geology. (Two afternoons of drafting each week during the first semester.) This course is open to students who have completed or who are taking Solid Geometry,

and who had either Engineering 1a or entrance credit in mechanical drawing.

2 units, 1st semester (FOSS) MT or ThF 1:30-4:30

2. Applied Mechanics:—

a. Mechanics of Materials.—A theoretical study of the strength and elastic properties of the ordinary materials of engineering construction. The main subjects covered are simple tension, compression, and shear; flexure, with application to simple, continuous, and non-homogeneous beams; long columns; torsion; repeated stress; sudden stress and resilience. (Lectures and recitations three hours a week.)

b. Testing of Materials.—Each student is required to make a series of experiments, testing the strength and elastic properties of structural materials. A careful record of all experiments is required of very student. (Laboratory work, six hours a week.)

Open to students who have completed the first- and second-year courses for Engineering students in Applied Mathematics; required of all students having Engineering as a major subject.

5 units, 1st semester (WING, MOSER)

Lec. MWF 9:15; Lab. MWF 10:15-12:15, or MT or ThF 1:30-4:30

3. Hydraulics:—

a. Theoretical Hydraulics.—This course treats of fluid pressure, the principles of fluid equilibrium, and the laws governing the flow of water through orifices, over weirs, in closed conduits, and in open channels, followed by a study of the basal theory of hydraulic turbines. Open to students who have completed courses 2 and 3 in Applied Mathematics.

5 units, 2d semester (HOSKINS) MTWThF 9:15

b. Experimental Hydraulics.—Including the calibration and use of instruments for the measurement of pressure, velocity, and flow of water under various conditions; the investigation of friction in pipes, bends, valves, and other obstructions, etc. Six hours per week in the laboratory on experimental work, computations, and reports. Open to students who have taken or are taking Engineering 3a.

2 units, 2d semester (MOSER)

MT 1:30-4:30 (for C. E. majors); MWF 10:15-12:15 (for M. E. majors); ThF 1:30-4:30.

[*Note.*—See also Hydraulic courses listed under Mechanical Engineering: Testing of Hydraulic Machinery (M. E. 26); Hydraulic Power Stations (M. E. 35b).]

LABORATORY FEES—Courses 1b, 2b, \$2 each; 1c, \$1; 3b, \$4.

I. CIVIL ENGINEERING

CHARLES DAVID MARX, CHARLES BENJAMIN WING, LEANDER MILLE
HOSKINS, JOHN CHARLES LOUNSBURY FISH, Professors.

JOHN HARRISON FOSS, Assistant Professor.

CHARLES MOSER, Instructor.

A. TOPOGRAPHIC ENGINEERING

4a. Elementary Surveying.—Recitations: systems of co-ordinate measurements, choice of systems, errors, checks, surveys, graphic solution of topographic problems. Field-work: experimental exercises, surveys. Drafting-room: computing, mapping. (Recitation two hours, field work and drafting nine hours, each week.) Open to students who have completed Engineering 1a and Plane Trigonometry. Required of students in Civil and Mining Engineering.

5 units, 1st semester (FISH) Rec. TTh 9:1.

Dft. M 1:30-4:30; Field ThF 1:30-4:30 (or S 9-4:30)

4b. Elementary Surveying.—For students in Mechanical and Electrical Engineering. (Field work, reading, and drafting, six hours each week.)

2 units, 1st semester (FISH)

Drafting and Field ThF 1:30-4:30 (or S 9-4:30)

4c. Advanced Surveying.—Supplementing course 4a. Field work: computations, drafting, and the use of references in connection with problems assigned along one or more of the following lines: land surveying (original surveys and re-surveys), latitude and azimuth, stake out structures, topographic surveying (with or without the plane table), mine surveying, hydrographic surveying, city surveying.

1 or more units, either semester (FISH) By arrangement

B. ENGINEERING ECONOMICS

5a. Engineering Economics.—The problem of economic selection, interest, sinking funds, first cost, salvage value and depreciation, elements of cost of service (including amortization), methods of estimating, basis of economic comparison, procedure in economic selection. (Written recitations and problems, six hours per week.)

2 units, 1st semester (FISH) Rec. TTh 11

5b. Engineering Estimates and Reports.—Each student is assigned the problem of choosing a structure for a stated service. He makes preliminary plans and estimates in connection with two or more structures.

tures proposed for the stated service, makes an economic comparison based on the estimated costs, and prepares a report on the object, conditions, methods, and result of his investigation. The object of the course is to offer training in analyzing problems of choosing structures, in the logical planning of the steps of an engineering investigation, in the execution of the steps (including use of references, of cost data, of methods of estimating, and arrangement and record of computation), and in the elements of report writing. Roughly, one third of the time is devoted to looking up references, one third to drawing and computing, and one third to writing and revising the report. Open to those who have taken the preceding course, and to others by permission.

1 or more units, either semester (FISH) By arrangement

C. RAILROAD ENGINEERING

6a. Railroad Surveying.—Recitations: curves and turnouts; preliminary and location surveys; earthwork. Field and office: exercises in laying out curves and taking cross-sections for topography and earthwork, and in plotting them; preliminary survey with profile and topographic map; paper location with profile and quantities; staking out paper location; earthwork surveys; final location profile and map; earthwork computations; distribution of material with use of mass diagram; overhaul computation. (Recitations two hours, drafting and field work nine hours, each week.) Open to students who have completed 4a. Required of students in Civil Engineering.

5 units, 2d semester (FISH)

Rec. TTh 9:15; Dft. M 1:30-4:30; Field ThF 1:30-4:30

6b. Railroad Location.—Locomotive tractive force and resistances thereto, velocity profile, momentum grade. Traction problems involving inter-relation of train weight, grade, speed, and characteristics of locomotive. Value of change in distance, curvature, rise and fall, and ruling grade, based on analysis of operating expenses. Pusher grades, balanced grades for unequal traffic and for adjacent divisions. Open only to students who have completed 5a.

2 units, 2d semester (FISH)

Rec. TTh 8:15

6c. Railroad Construction (Surveying and Engineering).—Field or office work assigned to individuals, according to their needs, along one or more of the following lines: supplementary work on simple, compound, and spiral curves, turnouts, connecting tracks, cross-sections, quantities, classification, and distribution. Excavating methods and

plants. Situation and drainage surveys; preliminary plans and estimates; choice of structure and site; working drawings; staking out inspection; estimates of work done. Collecting, recording, and filing information; computations and drawings; instructions and report. A formal, written, detailed report is required on each engineering problem assigned. Open, by permission, to students who have completed 6a or its equivalent.

1 or more units, either semester (FISH) By arrangement

D. STRUCTURAL ENGINEERING

8a. Elements of Design:—

1. *Materials*.—[See course 9 in Mining and Metallurgy.]

2. *Mechanics of Structures*.—Course 3 in Applied Mathematics extended to the analytical and graphical determination of stresses in simple structures.

3. *Theory of Structural Details*.—Course 2 in Engineering is extended to an investigation of the distribution of stresses in structural details.

Open to students who have completed course 1 in Engineering, or who have taken or are taking course 2 in Engineering, and also course 9 in Mining and Metallurgy. Required of all students having Civil Engineering as a major subject.

3 units, 1st semester (WING) WThF 1:30-4:00

8b. Elements of Design:—

1. *Materials*.—Structural materials, other than metals, are studied from an engineering standpoint. Wood, stone, brick, limes, cement, etc., are considered in order. (Lectures and assigned reading three hours a week first half of semester.)

2. *Foundations*.—Under this head are considered the bearing power of soils, strength of piles, distribution of pressures, and similar details connected with the design of simple foundations. (Lectures and assigned reading three hours a week, last half of semester.)

3. *Design*.—Complete designs are made, including working drawings, bill of materials, and estimate of cost, of some simple structures such as a mill building or highway structure. (Drafting-room, nine hours a week first half of semester; six hours a week last half of semester.)

4. *Testing*.—Extending the work of course 2b in Engineering. Each student is required to make a series of experiments, testing the physical properties of cement and other masonry materials. (Laboratory last half of semester.)

Open to students who have completed course 8a in Engineering; required of all students having Civil Engineering as a major subject.

5 units, 2d semester (WING, MOSER)

Lec. MWF 8:15; Dft. and Lab. WThF 1:30-4:30

8c. Elements of Design.—Courses 8a and 8b abridged to meet the requirements of students having Mining, Mechanical, or Electrical Engineering as a major subject. Special applications are made to hoisting and conveying structures, mill buildings, and central station buildings. Open to students who have completed courses 1 and 2 in Engineering and course 9 in Mining and Metallurgy.

2 or 3 units, 2d semester (WING) By arrangement

9. Structural Design.—This course comprises the determination of the stresses in modern types of bridges, including cantilever and swing spans, masonry arches, and arch ribs; the discussion of the most economical types, spans, and dimensions of bridges and bridge members; the study of the methods of constructing sub-aqueous foundations, shop methods, erection, inspection of material, specifications, and other factors influencing the design of structures. Designs are made by each student to fulfill actual conditions. Open to students who have completed course 8. (Lectures two hours per week, drafting nine hours.)

5 units, 1st semester; 5, 3, or 2 units, 2d semester (WING)

Lec. TTh 10:15 (1st sem.), 8:15 (2d sem.); Dft. WThF 1:30-4:30

E. HYDRAULIC ENGINEERING

12. Water-Supply Engineering for Towns and Districts.—Sources of supply. Collecting and storing of water, either for water supply of towns or for irrigation purposes. Settling, filtering, conducting, and delivering of water, including the study and design of all accessory works. (Three hours lectures and recitations, six hours drafting.) Open to students who have completed courses 2 and 3 in Engineering and 4a and 8a in Civil Engineering; required of all students who take their major in Hydraulic Engineering.

5 units, 1st semester (MARX)

Lec. MWF 10:15; Dft. MT 1:30-4:30

13. Sanitary Engineering.—Including sewerage of towns and drainage of lands. Special attention will be given to the study of all municipal sanitary problems, such as removal of sewage, destruction of garbage, construction, maintenance, sweeping, and repairs of streets and pavements. (Three hours lectures and recitations, six hours

drafting.) Open to students who have completed courses 2 and 3 in Engineering and 4a, 8a, and 12 in Civil Engineering; required of students who take their major in Hydraulic Engineering.

5 units, 2d semester (MARX) Lec. TTh 9:15; Dft. MT 1:30-4:

15. **Construction of Canals, River and Harbor Improvements.** Lectures and designing as per arrangement. Open to students who have completed courses 2a, 2b, and 3 in Engineering and 4a and 8a in Civil Engineering.

2 units, both semesters (MARX) MT 1:30-4:

16. **Technical Seminary.**—Study of German and French technical journals. Open only to fourth-year students in Civil Engineering.

2 units, both semesters (MARX) By arrangement

LABORATORY FEES—Courses 5b, 6b, 6c, 50 cents each; 8b, \$2; 4b, 6a, \$4 each.

II. MECHANICAL ENGINEERING

WILLIAM FREDERICK DURAND, GUIDO HUGO MARX, WILLIAM RANKIN ECKART, Professors.

EVERETT PARKER LESLEY, Associate Professor.

CHARLES NORMAN CROSS, LAWRENCE EDMISTER CUTTER, Assistant Professors.

EDWARD JOHN STANLEY, JAMES BENNETT LIGGETT, THERON JAM PALMATEER, ROBERT HENRY HARCOURT, HORATIO WARD STEBBINS, Instructors.

The following courses constitute a five years' curriculum leading to the degree of Mechanical Engineer. Students successfully completing the first four years of this curriculum will be granted the degree Bachelor of Arts.

[Numbers following subjects indicate number of units credit for the year]

FIRST YEAR—Applied Mathematics (10); Freehand Drawing (2); Chemistry (9); Shop Work (6); French or German (6); Mechanical Engineering A (2).

SECOND YEAR—Applied Mathematics (6); Mechanics (10); Line Drawing and Descriptive Geometry (6); Physics (8); Shop Work (2);

THIRD YEAR—Applied Mechanics (5); Hydraulics and Hydraulic Motors (5); Hydraulic Laboratory (2); Machine Drawing (2 or 3); Elementary Machine Design (5); Surveying (2); Metallurgy (3); Physics (2); Electrical Engineering (3); Shop Work (3).

FOURTH YEAR—Heat Engines (6); Engineering Reports (2); Machine Design (8); Experimental Engineering (6); Electrical Engineering (6); Shop Work (5).

FIFTH YEAR—Thermodynamics (1); Advanced Design (3 plus 3 elective); Experimental Engineering (3); Economics (2); Shop Administration (3); Power Plants (4); Pumping Machinery (2); Seminary (elective) (2); Thesis (8); Hydraulic Machinery Laboratory (2 elective).

The above represents the requirement for the student entering regularly with minimum mathematics and no advanced credit. For such student, in addition to the above curriculum, there should be a maximum possible elective among other subjects in other departments of the University of nineteen units. For students who may bring advanced credit in drawing, shop work, chemistry, and other subjects, the amount of possible elective may be considerably increased.

A. General Survey of Engineering Industries.—Special lectures and assigned topics. Required of first-year students.

1 unit each semester

By arrangement

1-8. Shop Work:—

1a. *Forge Practice.*—(2 exercises a week, half year.)

1b. *Lecture in Forge Work.*

3a. *Foundry Practice.*—(2 exercises a week, half year.)

3b. *Lecture in Foundry Work.*

5. *Woodworking.*—(2 exercises a week, half year.)

6a. *Pattern Shop Practice.*—(2 exercises a week, half year.)

6b. *Lecture in Pattern Shop Work.*

Courses 3a and 3b are prerequisite to courses 6a and 6b.

7. *Elementary Machine Shop Practice.*—(2 hours a week, half year.)

Courses 1a and 1b are prerequisite to course 7.

8. *Advanced Machine Shop Practice.*—(3 hours a week, half year.)

Courses 1-8 are open to all students, and required of students in Mechanical Engineering.

2 or 3 units, each semester

(LESLEY, STANLEY, LIGGETT, PALMATEER, HARCOURT)

10. Shop Administration.—A course of lectures on workshop organization and administration, factory accounting, wage systems, selection of machinery, factory methods, etc. Prerequisites: courses 1 to 7 inclusive.

3 units, 1st semester (LESLEY)

MWF 9:15

11. Freehand Machine Drawing.—Practice in making freehand sketches of machine parts, and their dimensioning in practical form for use in the shop, the sketches being made according to the principles of orthographic projection. The aim is to train the student in the reading of machine drawings through making a considerable number of sketches from actual machines and machine parts, and at the same time to familiarize him as much as possible with the actual machine parts. Open to all students, and required of students in Mechanical Engineering. (Six hours a week, second semester.)

2 units (CUTTER)

ThF 1:30-4

12. Elementary Machine Drawing.—Practice in making working drawings of machine parts, and in making tracings from these drawings. The purpose of the course is, not only to train the student in the technique of drafting and dimensioning, but also to familiarize him with the elements of machines, and, therefore, no drawings are made from copy, but all are made from the student's own sketches of the actual model. (Six or nine hours a week in drafting room: the six hours work for one unit credit.) Prerequisite: course 1a in Engineering, and first semester's work in Engineering 1b, or its equivalent; and, for Mechanical Engineering students, course 12 in Mechanical Engineering.

2 or 3 units, either semester (CUTTER)

(I) TTh 8:15-12:15; (II) MT 1:30-4

13. Elementary Machine Design.

a. Function of machines; motion, force, and work in machines; analysis of mechanisms; velocity, acceleration, and effort diagrams; parallel motions; cams; ratchets; toothed wheels; valve gear analysis and design. The aim is, not merely to present a course in pure mechanism, or kinematics, but also—by the introduction of the consideration of force, work, and energy, as well as motion—to show the purpose for which the mechanisms are used and the manner in which they function. (Three hours a week, lectures and recitations, second semester.) (3 units).

b. Drafting course applying the principles treated in a. (Six hours a week drafting, second semester.) (2 units)

Prerequisites: course 12 in Mechanical Engineering and course 1a in Engineering. Courses a and b must be taken together and are required of students in Mechanical Engineering.

5 units, 2d semester (G. H. MARX)

Lec. MWF 8:15; Drafting M or T or F 1:30-4

14. Machine Design.—Study of machine elements, such as bolts and screws; riveted joints and boiler design; keys, fits and fitting; axles, shafts, and spindles; journals, bearings, friction, and lubrication; ball and roller bearings; sliding surfaces; couplings and clutches; gear, belt, rope, and chain transmission systems; flywheels; brakes; springs; frames and supports; cylinders, etc.; leading to the design of complete simple machines. (Two hours a week recitation and lectures, six hours in the drafting-room, throughout the year.) Open to students who have completed course 13 in Mechanical Engineering, and who are taking course 2 in Engineering; required of students in Mechanical Engineering.

4 units, both semesters (G. H. MARX)

(1st sem.) Lec. MW 10:15; Dft. MT 1:30-4:30

(2d sem.) Lec. TTh 8:15; Dft. MW 9:15-12:15

15. Machine Design.—An abridged treatment of the field covered in courses 13 and 14. (Three hours a week recitations and lectures, six hours a week in the drafting-room, first semester.) Open to students who have completed Engineering 1b, Mechanical Engineering 12, and are taking Engineering 2. Intended for Engineering students whose major subject is not Mechanical Engineering.

5 units, 1st semester (G. H. MARX)

Lec. MWF 8:15; Dft. ThF 1:30-4:30

16. Advanced Machine Design.—Design of complete machines. Students may elect machine tools, cranes, steam or gas engines, or special problems. (One lecture and six hours drafting per week.) Intended for fifth-year students who have completed courses 14, 32, and 33.

3 units, both semesters (G. H. MARX, CUTTER)

Lec. F 10:15; Dft. 1:30-4:30, by arrangement

21-30. Experimental Engineering.

21. Calibration and Use of Engineering Apparatus and Instruments, including gas meters, thermometers, planimeters, indicators, dynamometers, fuel calorimeters, and the testing of lubricating oils. (One lecture, three hours in the laboratory, and five hours on reports, per week.) Required of fourth-year students in Mechanical Engineering.

3 units, 1st semester (ECKART, CROSS, STEBBINS)

Lec. Th 10:15; Lab. WThF 1:30-4:30 and F 9:15-12:15, by arrangement.

22. Testing of Steam Engines and Boilers, including determination of engine clearance; measurement of the flow of steam; steam calorimetry; valve setting; mechanical efficiency, economy, and thermal tests

of steam engines, steam turbines, gas engines; tests for speed regulation, flue gas analysis, and the testing of boilers. (One lecture, three hours in the laboratory, and five hours on reports, per week.) Open to students who have completed courses 21 and 32. Required of fourth-year students in Mechanical Engineering.

3 units, 2d semester (ECKART, CROSS, STEBBINS)

Lec. T 10:15; Lab. 1:30-4:30, by arrangement

23. *Testing of Power Plant Auxiliaries*, including hot-air engines, injectors, heaters and economizers, blowers, turbo-compressors, condensers, refrigerating machinery, automobiles, and a complete power-plant test. (One lecture, three hours laboratory, and five hours on reports per week.) Open to students who have completed courses 21 and 22. Required of fifth-year students in Mechanical Engineering.

3 units, 1st semester (ECKART, CROSS, STEBBINS)

Lec. F 8:15; Lab. 1:30-4:30, by arrangement

24. *An Abridged Course in Experimental Engineering*, intended for Civil Engineering, Geology and Mining, and Chemical Engineering students. Includes the calibration of apparatus, testing of steam and gas engines, steam turbines, boilers, etc. (One lecture, three hours in the laboratory, and eight hours on reports, every two weeks.) Open to students who have completed course 32.

2 units, 1st semester (ECKART, CROSS, STEBBINS)

Lec. T 9:15 (alternate weeks); Lab. 1:30-4:30 by arrangement

26. *Testing of Hydraulic Machinery*.—Including tangential water wheels, turbines, rams, centrifugal, rotary, jet, steam pumps, and sewage ejectors, and the investigation of surges in pipe lines, etc. (One lecture, three laboratory hours, and eight hours on computations, reports, etc., every two weeks.) Open to students who have taken Engineering 3b and Mechanical Engineering 21, 22, or 24.

2 units, 2d semester (ECKART, CROSS)

Lec. F 8:15 (alternate weeks); Lab. 1:30-4:30, by arrangement

30. *An Advanced Laboratory Course in the Investigation of Engineering Problems*. Open to all students who have completed courses 22, and 23.

1 to 5 units, both semesters (ECKART, CROSS)

31. *Engineering Reports and Specifications*.—Practice writing, with occasional lectures. Required of fourth-year students in Mechanical Engineering.

2 units, 2d semester (LESLEY)

By arrangement

- 32. Heat Engines.**—Mechanical theory of heat and its applications. (Two lectures and three hours' office work per week.) Required of fourth-year students in Mechanical Engineering.
3 units, 1st semester (DURAND, STEBBINS) TTh 9:15-12:15
- 33. Heat Engines.**—Continuation and application of course 32. (Two lectures and three hours' office work per week.) Required of fourth-year students in Mechanical Engineering. Lecture and office work as for 32.
3 units, 2d semester (DURAND, STEBBINS) TTh 9:15-12:15
- 34. Thermodynamics.**—A course in theoretical thermodynamics, with special reference to heat engines, and intended to supplement course 32, which is a prerequisite. Required of fifth-year students in Mechanical Engineering.
1 unit, 2d semester (DURAND) M 8:15
- 35. The Mechanical Engineering of Central Power Stations.**—Lectures. Prerequisite, course 32.
2 units, 1st semester (DURAND) MW 10:15
- 35b. Hydraulic Power Stations.**—A discussion of the principles which enter into the design of hydraulic power stations: general control of water in tunnels and penstocks, surge chamber control of surges and shocks, valves and regulating devices, penstocks and their installation, selection of units, characteristics of impulse and reaction types, speed regulation, installation tests, and special problems. Open to students who have completed Engineering 3a.
2 units, 1st semester (DURAND) MW 8:15
- 36. Pumping Machinery.**—A lecture course for fifth-year students. Prerequisite: course 32 and Engineering 3a.
2 units, 2d semester (DURAND) TTh 10:15
- 37. Seminary.**—A weekly conference for the discussion of current engineering literature and of special topics. Open to senior and advanced students only.
1 unit, both semesters (DURAND) By arrangement
- LABORATORY FEES.**—Courses 1a, 3a, 7a, \$4 per credit hour; courses 5, 6a, \$3 per credit hour; course 8, \$2 per credit hour; courses 21, 22, 23, \$6; courses 24, 26, 30, \$2 per credit hour; 32, \$1; 35, 50 cents.

III. ELECTRICAL ENGINEERING

HARRIS JOSEPH RYAN, Professor.

JAMES CAMERON CLARK, Assistant Professor.

FRED L. MULOCK, Instructor.

A five-year curriculum is arranged for students who will be graduated with the degree of Engineer in Electrical Engineering. The courses taken up during the first four years are identical in Mechanical and Electrical Engineering; both classes are registered in the Mechanical Engineering department. Students successfully completing this portion of the curriculum will be graduated with the degree of Bachelor of Arts. While pursuing courses scheduled for the fifth year of the Electrical Engineering curriculum students are registered as majors in the Electrical Engineering Department.

FIRST, SECOND, THIRD and FOURTH YEAR courses are identical with corresponding Mechanical Engineering courses.

FIFTH YEAR—Differential Equations, Hyperbolic Functions and Determinants (Applied Mathematics, 3 units); Electrical Engineering Technology (Electrical Engineering 4a, lectures, 5 units, and 4b, laboratory, 8 units); Photometry and Illumination (Physics 9a, 1 unit); Alternating and Transient Current Phenomena (Electrical Engineering, 3 units); Electrophysics: Foundation of Electrotechnics (Physics, 4 units); Thesis (Electrical Engineering T, 6 units); Seminary (Electrical Engineering S, 2 units). Total, 31 units.

1. **Electricity in Engineering.**—An abridged course in the industrial applications of electricity, intended for non-electrical engineering students. Prerequisites: first five semesters of any of the Stanford Engineering curricula.

4 units, 2d semester (CLARK, MULOCK)

Lec. WF 9:15; Lab. by arrangement

2. **Electrical Energy.**—Required of third-year students in Mechanical and Electrical Engineering. Class and laboratory instruction in the technology of magnetic, electric, and electrostatic phenomena, introductory study of meters, transformers, machines, and auxiliaries. Prerequisites: Applied Mathematics 1, 2, 3; Engineering 1a, 1b, 2a, 2b; Mechanical Engineering 11, 13a, 13b; Physics 6a, 6b, 9.

2a. **Recitations.**

2 units, 2d semester (MULOCK)

Th 8:15-10 = 15

2b. Laboratory Work.

2 units, 2d semester (CLARK, MULOCK) MTWTh 1:30-4:30

[Course 2 is supplemented by Physics 9, laboratory work in electrical measurements, 2 units, 1st semester.]

3. Electrical Engineering.—Required of fourth-year students in Mechanical Engineering and Electrical Engineering. Lectures, laboratory, and class work. Prerequisites: Electrical Engineering 2a, 2b; Engineering 3a.

3a. Lectures.—General Practice. (1) Standardization authorized by the A. I. E. E. (2) Fire Hazard, National Electrical Code. (3) Transmission Economies. (4) Standard Machinery, Auxiliaries and Structural Supplies. (5) Municipal Distribution of Electricity for Miscellaneous Service. (6) Long Distance Transmission of Power for General Purposes. (7) Discussion of Typical Installations. (8) Elements of Finance Controlling the Uses of Electricity. (9) Survey of Electrical Industries. (10) Historical and Biographical Sketches.

3 units, 2d semester (RYAN)

3b. Laboratory Work.—Characteristic performance of standard machinery and auxiliary apparatus.

4 units, 1st semester (CLARK, MULOCK) By arrangement

4. Electrical Engineering Technology.

LECTURE COURSES.—Properties of materials of construction and technical study of machinery, transformers, transmission lines, distributing systems and auxiliaries.

a'. Machinery. 2 units, 1st semester (CLARK)*a''. Transmissions.* 3 units, 1st semester (RYAN)

LABORATORY COURSES.—Materials tests; machinery and auxiliaries design data and acceptance tests; special meter performance tests and calibrations.

b'. Meters. 2 or 3 units, 1st semester (MULOCK)*b''. Machinery.* 2 or 3 units, 1st semester (CLARK)*b'''. Transmissions.* 2 or 3 units, 1st semester (RYAN)

(8 units required.)

5. Alternating and Transient Current Phenomena.—Steinmetz and Kennelly methods, including applications of hyperbolic functions and determinants for obtaining the physical constants and characteristic behavior of electromagnetic circuits. This course is given by the Departments of Applied Mathematics and Electrical Engineering in

co-operation. Recitations and problems. Prerequisite: Applied Mathematics 8.

3 units, 2d semester (RYAN, MORENO)

10. Seminary.—A weekly conference for the discussion of current electrical engineering literature and of special topics.

1 unit, both semesters (RYAN)

11. Thesis.—Subjects as approved to suit the needs of the individual.

1 unit, 1st semester; 5 units, 2d semester (RYAN, CLARK, MULOCK)

The Stanford Branch of the American Institute of Electrical Engineers is an organization authorized by the Institute and maintained by the members of the graduating class for the discussion of the Proceedings of the Institute, and of other topics as assigned, and the review of current electrical literature.

LABORATORY FEES—\$2 per unit of university credit.

SYLLABUS FEES—Applicable to syllabus, lantern slides, and charges \$1 per course-section.

MEDICINE

WILLIAM OPHÜLS, Acting Dean

GEORGE BURBANK SOMERS, Secretary of the Medical Faculty.

BUILDINGS AND EQUIPMENT

The buildings in San Francisco occupy four fifty-vara lots bounded by Clay, Sacramento, and Webster streets, and consist of the Clinical and Laboratory Building, including Lane Hall; Lane Hospital, modern building in brick and stone, with a capacity of one hundred and eighty beds; the Nurses' Home; and the Lane Medical Library. The Clinical and Laboratory Building has recently been remodeled and is devoted entirely to out-patient clinics and laboratories.

The laboratories of Anatomy, Bacteriology and Immunity, Chemistry, and Physiology are located on the Campus at Stanford University.

CLINICAL OPPORTUNITIES

The Stanford Hospitals

LANE HOSPITAL

The University Hospital was designed as a teaching Hospital and was built by Dr. Levi Cooper Lane. It is under the immediate control

the Clinical Committee appointed from the Medical Faculty by the President of the University with the approval of the Board of Trustees. It is a general hospital receiving both private and clinic patients, situated at Clay and Webster Streets and directly connected with the Clinical and Laboratory Building. In its clinical department there are over one hundred beds used for purposes of teaching. These are arranged into five wards, one each for Surgery, Medicine, Gynecology, Obstetrics, and Pediatrics. As the patients in these clinical beds are sent in largely from the Out-patient clinic and as they remain in the Hospital for short periods of time only, unusual opportunity is offered for the study of selected cases.

STANFORD HOSPITAL

Work has begun on the construction of a new surgical pavilion, to be known as the Stanford Hospital, to accommodate one hundred and eighty patients. The engine-room and power-house for this new hospital are now completed and a large central laundry has been constructed.

The tuberculosis clinic is held in close cooperation with the San Francisco Society for the Study and Prevention of Tuberculosis.

The Associated Charities sends to the clinic a portion of its maternity cases, and provision is also made for the care of a portion of their sick poor. The San Francisco Maternity contributes a considerable sum towards the support of the Women's Clinic. This is particularly devoted to out- and in-patient obstetrics. The Fruit and Flower Mission assists greatly in the care of maternity cases.

During the year 1912-13 Mrs. Emily B. Hopkins presented the Hospital with \$10,000 for the endowment of a bed. Mrs. Kate Felton Elkins provides maintenance for a bed, and she and her brother, Charles N. Felton, Jr., provide a fund for the care of clinical patients. Other friends of the Hospital have contributed freely for the care of clinical patients.

Charles G. Lathrop, former Treasurer and Business Manager of the University, left \$10,000 by his will for the Medical School of the University.

David Hewes left \$6,000 to the Lane Hospital for the endowment and maintenance of a bed to be known as the "David Hewes Free Bed."

PATIENTS FUND

The Trustees of the University have established a fund known as the "Patients Fund," the income of which is used for the support of free beds. This fund, to which contributions of any size can be made at any time, originated from money received from former patients of the University Hospital. Much of it has been given by grateful clinical patients.

SAN FRANCISCO HOSPITAL

At the present time the Medical School controls over one hundred beds in the new San Francisco Hospital, averaging about a thousand patients per year. This hospital, erected at an expense of two million dollars, is one of the finest and most complete structures of its kind in America. Possessing separate buildings for the care of contagious diseases and of tuberculosis, in addition to the main group for general surgical and medical cases, there is centered within the hospital grounds, convenient for teaching purposes, an abundance as well as a great variety of clinical material.

OUT-PATIENT DEPARTMENT

The lower floor of the Clinical and Laboratory Building is devoted entirely to the Surgical Outpatient Clinic and its various subdivisions; the second floor to the Medical Outpatient Clinic with its subdivisions; the three upper floors contain the Pathological Museum and the laboratories of Experimental Medicine, Pathology, Pharmacology, Obstetrics and Gynecology, and Experimental Surgery. The laboratory of Clinical Pathology and the Outpatient Department are separated only by a short corridor from the clinical wards of the Hospital, so that both in- and out-patients are equally available for teaching purposes. The front part of Lane Hall has been converted into a modern amphitheater. About twelve thousand new patients were received during the past year, with a total number of visits of about ninety thousand.

DENTAL CLINIC

In connection with the Out-patient Department an Emergency Dental Clinic has been established. Complete equipment has been provided and the work taken up first by Dr. Fred Wolfsohn and later by Dickson G. Bell, D.D.S., under the supervision of Dr. Jas. G. Sharp. Dr. Palmer, the Chief Anaesthetist of Lane Hospital, devotes time twice a week to the administration of nitrous oxide gas in order that dental operations may be performed.

HOSPITAL INTERNESHIPS

Eleven internes and a House Officer are appointed annually at the

Lane Hospital. Five of these are Senior Internes and have a continuous service for one year with the option of renewal in any of the following divisions: Medicine, Pediatrics, Surgery, or Obstetrics and Gynecology. Six Junior Internes, with an alternating service, are likewise appointed. They are assigned in rotation to a two months' service in Psychiatry at the Napa State Hospital. Four of these are eligible for Senior Internships later. A Senior Externe is also appointed for the Eye, Ear, Nose, and Throat Department. Internships are also available in the Stanford service at the San Francisco Hospital and at other hospitals in the City and the State.

LIBRARY FACILITIES

The LANE MEDICAL LIBRARY, founded by the Directors of Cooper Medical College, as provided by the will of Mrs. Levi Cooper Lane, comprises 40,000 volumes. The larger part of the library was obtained from the New York Academy of Medicine and represents their duplicate collection made up largely of books originally belonging to the once well known Medical Library of the New York Hospital. About 500 periodicals are currently received, and the numerous files of bound volumes are practically complete.

Cards of current medical accessions are received from the Library of Congress and from the John Crerar Library in Chicago. These, with the catalogues of the Surgeon General's Library, facilitate borrowing books from three great libraries. Loans are also made to and from the University Library at Stanford, which contains about 200,000 volumes.

ADMISSION TO THE SCHOOL OF MEDICINE

(Applicants for admission to the first three semesters in medicine should communicate with The Registrar, Stanford University, California; those desiring to enter the upper classes of the Medical School (i. e., from the fourth to the eighth semesters), should communicate with The Dean, Stanford University Medical School, cor. Sacramento and Webster streets, San Francisco, Cal.)

Three years of collegiate work in Stanford University (approximately ninety unit hours), or its equivalent as accepted by the Committee on Advanced Standing, is required for admission to the School of Medicine. This preparatory training must include Chemistry, including Qualitative Analysis (and after 1917, Quantitative Analysis),*

* Course K (combined course) in the Department of Chemistry is intended to cover this work. Beginning with 1917 this course will be required for admission to the Medical School. In the meantime all prospective students are strongly urged to take it.

one year of Physics, and Physiology or Biology, with laboratory work in each, and such a reading knowledge of French or German as shall be acceptable to the School of Medicine. It is recommended that both German and French be studied and that a lecture and laboratory course be taken in Psychology.

Beginning with 1919 three units of Organic Chemistry will be required for entrance to the Medical School. In the meantime, owing to the crowded condition of the Medical curriculum in the first year, prospective students are urgently advised to take the required three units of Organic Chemistry before entering the Medical School.

Candidates for admission to the School of Medicine, or for advanced standing in the School, are permitted to register with one condition, but the condition must be removed within one year to the satisfaction of the head of the School or Division in which the condition was incurred.

The State Law governing the practice of Medicine in California prescribes that every person before practicing Medicine or Surgery must produce satisfactory testimonials of good moral character and a diploma issued by some legally chartered medical school approved by the Board of Medical Examiners, the requirements of which school shall have been at the time of granting such diploma in no degree less than those prescribed by the law. The main provisions of this law are that the applicants must show records of four medical courses of thirty-two weeks' duration, following a preliminary preparation, at present of a high school course or specified equivalent and after January 1, 1919, in addition, a course which includes at least one year of work of college grade in each of the subjects of Physics, Chemistry, and Biology. The 'specified four years' medical course includes 4000 schedule hours, embracing the usual medical curriculum. In the course of study outlined the hours required are hours of actual work in the class room, laboratory, or hospital, and at least eighty per cent of actual attendance is required.

Students in any Department of the University who desire to enter upon the study of Medicine and who have included in their course of study the subjects required for admission to the Medical School, may, at the beginning of their fourth or senior year in the University, enroll as students in medicine and continue as candidates for the degree of Bachelor of Arts.

A student who, through delay in making a choice of Medicine, is unable to complete the requirements of his Major department and the first year in Medicine by the end of his senior year, may nevertheless

register in Medicine and be eligible for the degree of A. B. in the Department of Physiology and Histology at the end of the eighth semester—the second semester in Medicine.

Students who have included in their course of study the subjects required for admission to the Medical School while retaining their registration in their Major Department as candidates for the degree of A. B., must also enroll in the School of Medicine during the fourth year and pay the fees of the School in order that this year may count as part of the four years' registration in Medicine as required by the law of the State and the five years required by the regulations of the University. Tuition fees are required for but four years of the medical course.

LIMITATION OF THE NUMBER OF STUDENTS

The accommodations of the Medical School at San Francisco render it inadvisable to admit more than 25 students to each class. It will therefore be necessary to restrict the number of students to 25 in each class, commencing with the fourth semester.

Students planning to continue their work at Stanford University after the first year should notify the Dean in writing to that effect at as early a date as possible, and file a complete record of their preparatory, collegiate, and medical work with the Registrar before the end of the third semester in Medicine. No one will be permitted to enroll in the fourth semester in Medicine with less than 135 units of credit or with a condition in more than 5 units in any required subject, except by consent of the Dean, which must be confirmed by a special vote of the Faculty.

THE EIGHT YEARS' CURRICULUM

The combined eight years' curriculum—three years of college work and five years in medicine—leads to the degrees of Bachelor of Arts and Doctor of Medicine.

SPECIAL WORKERS

Physicians and others who are properly qualified, but not candidates for a degree, may be admitted to work in the School of Medicine with the permission of the Dean of the School and of the professor or professors concerned. Such persons shall be listed as Special Workers and pay such fees as are required by the Dean and the Executive Head of the Division concerned.

THE CURRICULUM IN MEDICINE

The required period of study for the degree of Doctor of Medicine is five years (ten semesters). The work of the first three semesters

is given at Stanford University and is devoted to anatomy, bacteriology, chemistry, embryology, histology, neurology, and physiology. The next five semesters are devoted to work in the pharmacological, pathological, and clinical laboratories and in the hospital wards and the outpatient department in San Francisco. The last year is spent in hospital work.

In order to correlate the work of some of the Divisions and to facilitate research in others, all courses in Medicine, except those in anatomy, bacteriology, chemistry, and physiology, are given in San Francisco. By reducing the number of required hours to approximately the number decided upon by the Association of American Medical Colleges, the student's opportunity for taking optional and elective courses has been increased and time obtained for thesis work.

REQUIRED INTERNE YEAR

All students are required to take a fifth practical year in Medicine before receiving the degree of Doctor of Medicine. Arrangements may be made so that the fifth year may be spent as worker in a laboratory. No tuition fee is required of internes and most internships include a small salary.

FEES

The tuition fees of the Medical Department are \$150 per annum for four years, payable in installments of \$75 each semester; \$5 per semester for the first three semesters, covering charges for material; and such other deposits to cover breakage or loss of apparatus and materials, as may be required in any department or division, these deposits being returnable, less charges for breakage, loss, or wear and tear of apparatus, or for materials used. The total deposits for this purpose may vary from \$10 to \$20 per annum.

MICROSCOPES AND INSTRUMENTS

By action of the Medical Faculty taken May 12, 1912, students will be expected to supply themselves with microscopes. The Medical School offers the use of a microscope for the college term, not including the summer vacation, to students who do not possess instruments of their own, on deposit of \$10 and a rental of three dollars per semester. This deposit, less the cost of necessary repairs, is refunded on return of the microscope. In the laboratories of physiology and histology and in embryology microscopes are furnished free.

All students are expected to provide themselves with a satisfactory blood counter for their own use, and such other pieces of individual apparatus as are essential to the required work.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE

The candidate for the degree of Doctor of Medicine must, according to the laws of the State, have attained the age of twenty-one years, and have attended a medical college of recognized standing for four years. He must further have fulfilled the entrance requirements of the Medical School of Stanford University before enrolling as a medical student, have satisfactorily completed the required curriculum, passed all examinations, paid in full the required fees, and have spent the last two of the five years in Medicine at the University. Physicians who have already received the degree of Doctor of Medicine are not received as candidates for this degree by the Stanford Medical School.

REGULATIONS CONCERNING THESES

A Thesis based as much as feasible upon research work will be required of each student. If the thesis is not completed previously, four curriculum hours of the seventh and eighth semesters are to be devoted to its preparation under the supervision of one of the Divisions.

Students of Medicine may select the Division in which they desire to write their Thesis, and if properly qualified may begin work on the same at any time before the beginning of the second semester of their fourth year in Medicine. The topic for investigation or the subject matter for study shall be chosen with the advice and consent of the Executive Head of the Division concerned, and no change of subject shall be made without the consent of the Executive under whose direction the work was begun. Except by special permission theses must be completed by the end of the fourth year in medicine.

ADVANCED DEGREES IN THE MEDICAL DEPARTMENT

The Divisions of the Medical Department are considered as equivalent to other departments of the University in respect to candidacy and requirements for the degrees of Master of Arts and Doctor of Philosophy, and all the foregoing regulations apply to these divisions and division faculties as to departments and department faculties, with the following modifications and limitations:

1. Candidates for these degrees must have received the degree of A. B. at Stanford, or an equivalent degree elsewhere, and must have completed all requirements for admission to the Department of Medicine, and such other requirements as each division faculty may prescribe.
2. Time spent in candidacy for the degree of Master of Arts or Doctor of Philosophy will not be counted toward the degree of Doctor of Medicine.

3. Candidates for these degrees in the divisions of Medicine, Surgery, and Obstetrics and Gynecology, must have received the degree of Doctor of Medicine.

SUMMER GRADUATE MEDICAL COURSE

JULY 6 TO AUGUST 15, 1916

MEDICAL GROUP

1. *Clinical Medicine.* (ADDIS, DICKSON, BOARDMAN, BARNETT, CLARK, O'NEILL, TUPPER, REED, BEHLOW) Daily, 11

The class is limited to ten. The work will consist of clinical studies and demonstrations covering the various methods of diagnosis and treatment. Special attention will be devoted to the following: Diabetes and Gout (ADDIS); Gastro-Intestinal Diseases (BOARDMAN, BEHLOW); Tuberculosis (CLARK); Cardio-Renal Diseases (DICKSON, TUPPER); Infectious Diseases (O'NEILL); Tropical Diseases (REED). In this work the material of the Out-patient Department of the University, the wards at Lane Hospital, the Stanford wards at the San Francisco Hospital, the Tuberculosis Clinic and Tuberculosis Hospital, the Isolation Hospital will be available, and the members of the class will have the opportunity of personally following cases in the medical wards of Lane Hospital under the direction of the members of staff, and of attending daily rounds from 9 to 10:30. Fee, \$35.

2. *Clinical Pathology.* (BARNETT) TThS

The class is limited to six. The work will consist of talks on various methods and their application and interpretation in Clinical Medicine, with practical laboratory work in the examination of blood, urine, stool, sputum, stomach contents, cerebro-spinal fluid, etc. The laboratory will be open daily for work. Fee, \$35.

3. *Actinography.* (BOARDMAN) Daily 1:30-2

The class is limited to six. The work will cover the field of X-ray diagnosis and treatment, especial attention being given to the study of gastro-intestinal diseases, with practical work in fluoroscopy, radiography and radiotherapy. Fee, \$35.

4. *Clinical Neurology.* (SCHALLER, INMAN, MEHRTENS, COSGRAN, at Medical School) TTh 11

(WOLFSON, at San Francisco Hospital) S 11

The class is limited to ten. The work will consist of clinical studies and demonstrations of neurological material. On Tuesdays and Thursdays

days DR. SCHALLER and assistants will meet the class in the Neurological Clinic in the Medical School building. On Saturdays DR. WOLFSOHN will hold rounds on the neurological material in the Stanford service at the San Francisco Hospital. The members of the class will also have the opportunity of studying the neurological material in the Out-patient Department and in the wards. Fee, \$25.

5. *Dermatology and Syphilis.* (ALDERSON) TWF 9-10

The class is limited to six. The work will consist of clinical studies and demonstrations of dermatological cases, especial attention being given to syphilis and the various methods of treatment, to the histopathology of skin diseases and vaccine therapy. Fee, \$35.

6. *Pediatrics.* (PORTER, FABER, YERINGTON, LYMAN) Daily 9-10:30

Class limited to six. The work will consist of clinical studies and demonstrations in the Out-patient Department and ward rounds in the Children's Ward of Lane Hospital. Special attention will be given to infant feeding, with opportunity for laboratory work in milk analysis, stool examination, etc. Fee, \$25.

7. *Serology.* (OLIVER) TF 9-11

The class is limited to six. The work will consist of talks, demonstrations, and practical work in serological diagnosis, Wassermann tests, etc. Laboratory will be open for work in odd hours. Fee, \$25.

SURGICAL GROUP

8. *Clinical Surgery.* (COWAN, BLAISDELL, ROTHGANGER, HAAS, HYDE, HARBAUGH) Daily 8:30

The class is limited to six. The work will consist of daily ward rounds in the Surgical ward of Lane Hospital or the Stanford ward at the San Francisco Hospital.

Routine work in Out-patient Department, MWF 9:30-11; Diagnostic clinic, TTh 11-12; Operative clinics at Lane Hospital, T 10-12, Th 8:30-11, I-3, S 8:30-; Operative clinics at the San Francisco Hospital, F 8:30-12.

9. *Operative Surgery.* (EAVES) Hours to be arranged

The class is limited to six. The work will cover surgical anatomy, important amputations, ligations, general bone surgery, abdominal and pelvic operations—this work to be performed on cadavers and on laboratory animals. Fee, \$30.

10. *Anatomy.* (BLAISDELL)

The laboratory will be open and material will be available for those desiring work in dissection under the supervision of DR. BLAISDELL.

11. *Orthopedic Surgery.*

(a) Clinical instruction in the Out-patient clinic. (FISHER, LANGNECKER.) MTTh 9:30-11. Class limited to six. Fee, \$25.

(b) Postural Deformities and Deficiencies. (LANGNECKER) MWF 1-3.

The relation of correct posture to human efficiency will be studied, including an anatomic explanation of the so-called carnivora and herbivora types of humans with their various deviations from the normal. Also methods and treatments for the improvement of deformities resulting (1) from congenital or acquired abnormalities, or (2) from infantile, obstetrical and spastic paralyses, etc. Open to medical students and teachers interested in postural correction. Fee, \$25.

(c) Lateral Curvature and the Technic of Orthopedic Apparatus. (LANGNECKER) Two hours a week; hours to be arranged. Class limited to eight. Fee, \$20.

(d) Growth and Development of Bone. (FISHER) Two hours weekly. Class limited to five. Laboratory course. Fee, \$20.

(e) Operative and Ward clinics in the Lane Hospital. (LANGNECKER, FISHER) F 10:00. Open to students in courses a, c, or d.

(f) Instruction in the Pathology of Bone and Joint Diseases. (ELY) Fee and duration of course by arrangement.

12. *Clinical Ophthalmology.* (BARKAN) MWF 1:30-3:30

The class is limited to ten. The work will consist of clinical lectures, the study of clinical material in the Out-patient Department from a diagnostic and therapeutic standpoint, and instruction in the common methods of examination and treatment. Minor operations will be demonstrated and as far as possible performed by the class. Each student will have ample opportunity to treat external diseases, and to ophthalmoscope. Tuesday afternoons the operating room at Lane Hospital will be available for attendance at eye operations. Fee \$35.

13. *The Eye and General Medicine.* (BARKAN) MTWThF 5-6 (last week of session)

Class unlimited. The work will consist of five illustrated lectures covering the eye conditions found in diabetes and nephritis, syphilis arteriosclerosis, amaurotic family idiocy, hysteria, brain tumor, abscess, meningitis, and other intra-cranial conditions. Fee, \$10.

14. *Principles and Practice of Refraction* (BARKAN) MWF 3:30-4:30

Class limited to five. This course will consist of short talks on the principles of refraction, with practical work in refraction, under the supervision of the instructor. Fee, \$25.

15. *Otology and Laryngology.* (McNAUGHT) MTWThF 3-4

For a class of six. The work will include general clinical studies and demonstrations of routine cases, with especial consideration of the physiology and pathology of the middle ear and labyrinth, and the surgical anatomy of the nose and throat, with specimens and operative demonstrations. Members of the class will have the privilege of following the routine handling of cases in the Out-patient Department and in the Clinic Wards of the Lane Hospital. Fee, \$35.

16. *Genito-Urinary Surgery.* (RIGDON, WILLIAMS, HAAS, WOOLSEY) MWF 9-10

The class is limited to ten. The work will consist of routine clinical studies and demonstrations of cases and of operative clinics. The members of the class will be privileged to follow the handling of the routine work in the Out-patient Department and in the Clinic Wards of Lane Hospital. Fee, \$35.

OBSTETRICS AND GYNECOLOGY

17. *Gynecology.* (STEPHENSON, GIBBONS, GIRARD)

The work will consist of:

(a) Daily morning instruction in the Out-patient Department, in methods of examination, diagnosis and treatment.

(b) Operative Clinics—T, 8 a.m., San Francisco Hospital; T, 2 p.m., W, 10 a.m., F, 2 p.m., Lane Hospital.

(c) Study of pathological material of the Department in the Pathological Laboratory. T, 2 p.m. Fee, \$35.

18. *Practical Obstetrics.* (MOORE)

Students are to live in the Clinic and devote their entire time to Obstetrics. The work will consist of routine obstetrical work with talks and demonstrations on pelvic measurements, antepartum examinations, confinement in patients' homes and in hospitals, postpartum care and examination of patients six weeks after delivery. Fee, \$25.

19. *Cystoscopy.* (BEASLEY, WILLIAMS) MTWThF 8-9 a.m.

Each class must consist of not less than three. The work will include demonstrations and practical instruction in cystoscopy, urethral catheterization and methods of estimating renal function. Fee, \$35.

20. *Anaesthesia.* (PALMER) W 4-5

Class limited to six. The work will consist of talks on the various anaesthetics. The members of the class will have the privilege of administering the routine clinic anaesthesias under the direction of Dr. Palmer.

21. Pathology. (BAILEY, OLIVER)

The work will consist of discussions and demonstrations of mens in selected subjects and clinical autopsies. The material Department will be at the disposal of the members of the class study. Fee, \$25.

THE CURRICULUM

[The Roman numerals in parentheses indicate the number of the the Arabic numerals, the number of hours in each course.]

FIRST SEMESTER	Lec. hours	Lab. hours	o
Neurology—Gross and Minute Anatomy of the Brain and Spinal Cord (IV) ..	1	5	
Histology (IX)	1	5	
Gross Anatomy (II, III, IV)	1	9	
Physiology—Muscle and digestion (II) 2		5	
Embryology (Zool. V)		6	
	5	30	1
SECOND SEMESTER			
Histology (IX)	1	5	
Gross Anatomy (II, III, IV)	2	10	
Physiology—Blood and circulation, res- piration, nutrition, metabolism, nerv- ous system, sense organs (III)	2	10	
Organic Chemistry (I)	3		
	8	25	
THIRD SEMESTER (First Semester of Second Year)			
Bacteriology (II)	4	7	
Gross Anatomy (V)	2	11	
Physiological Chemistry (III, IV)	3	9	
	9	27	
FOURTH SEMESTER (Second Semester of Second Year)			
		Hours pe	
Medicine (I)			
Clinical Pathology (II)			
Physical Therapeutics (III)			
Pharmacology and Materia Medica (Ia)			
Surgery (I, 2½) (II, 2) (III, 2)			
Pathology (I)			

FIFTH SEMESTER (First Semester of Third Year)

Medicine (V, 8) (VII, 1)	9
Clinical Pathology and Experimental Medicine (IV)	2½
Neurology (XII)	1
Pediatrics (XVIII)	2
Pharmacology and Materia Medica (Ib).....	3
Surgery (IV, 3) (VII, 5)	8
Surgical Pathology (VI)	2
Obstetrics (I, 2) (II, 1)	3
Pathology (III)	4

34½

SIXTH SEMESTER (Second Semester of Third Year)

Medicine (VI, 4) (VII, 1)	5
Clinical Pathology and Experimental Medicine (IV)	2½
Neurology (XIII)	2
Pediatrics (XIX)	5
Surgery (V, 2) (VII, 4)	6
Surgical Pathology (VI)	2
Obstetrics and Gynecology (I, 2) (II, 1)	3
Pathology (III)	4

29½

SEVENTH SEMESTER (First Semester of Fourth Year)

Medicine (VII, 1) (VIII, 4)	5
Pediatrics (XX)	2
Dermatology (XXII)	3
Legal Medicine (XXVII)	1
X-Ray (X)	1
Psychiatry (XVI)	1½
Surgery (VIII)	3
Orthopedic Surgery (XIII)	2
Genito-Urinary Surgery (XII)	3
Eye, Ear, Nose, and Throat (X, 2) (XI, 2).....	4
Obstetrics (III)	2
Gynecology (IV, 2) (V, 1)	3
Hygiene (I)	1
Thesis	4

35½

EIGHTH SEMESTER (Second Semester of Fourth Year)

Medicine (IX)	6
Neurology (XIV)	2
History of Medicine (XXV)	1
Dietetics (XXVI)	1
Psychiatry (XVII)	1½
Surgery (IX)	4
Eye, Ear, Nose, and Throat (X, 2) (XI, 2)	4
Obstetrics (IV)	2
Gynecology (IV, 2) (V, 1)	3
Hygiene (I)	1
Thesis	4

29½**NINTH AND TENTH SEMESTERS—HOSPITAL YEAR****Clinical Examinations in Medicine, Surgery and Obstetrics.**

I. DIVISION OF ANATOMY**ARTHUR WILLIAM MEYER, Professor.****EDGAR DAVIDSON CONGDON, Assistant Professor.**

[The courses of study are as outlined under Anatomy, pp. 95-97.]

II. DIVISION OF BACTERIOLOGY AND IMMUNITY**WILFRED HAMILTON MANWARING, Professor.****HARRY JOHNSON SEARS, Instructor.****MARCUS CLAUDE TERRY, Clinical Instructor.****HARRY CARSON COE, Assistant.**

[The courses are as outlined under Bacteriology and Immunity, pp. 97-98]

III. DIVISION OF CHEMISTRY**JOHN MAXSON STILLMAN, ROBERT ECKLES SWAIN, Professors.*****1. Organic Chemistry.**—A lecture course embracing a study of the classification, structural formulae, and properties of the more important compounds of carbon. The chemical relationships of the large

*Beginning with 1919 this course will be required before entrance to the Medical School. In the meantime all prospective students are urged to include it in their Pre-medical work.

groups of organic compounds, alcohols, aldehydes, and ketones, acids, amines, and the halogen, sulphur, and nitrogen compounds will be emphasized, special attention being given throughout the course to those compounds which are of physiological and pathological interest. [Course 3a in the Department of Chemistry.]

3 units, 2d semester (SWAIN) MWF 11:15-12:15

2. Toxicology.—A laboratory course, accompanied by informal lectures, dealing with the more important poisons, their physiological action and the prominent reactions employed in their identification. A search for the common poisons, based on a systematic scheme of analysis, will be made on artificially prepared materials. Course Kb (Quantitative Analysis) or its equivalent is a prerequisite. Optional.

3 afternoons, 2d semester (SWAIN)

3. Physiological Chemistry.—A laboratory course including a preliminary study of the proteins, carbohydrates, and fats, and the action of the various digestive fluids upon them, followed by a chemical examination of the bile, blood, milk, the chief tissues of the animal body, and the excretions. This course should be preceded by the equivalent of Courses 1, a, and k, in the Department of Chemistry, and course 1 above. (Course g in the Department of Chemistry.)

3 afternoons, 3d semester (SWAIN) MTW 1:30-4:30

4. Physiological Chemistry.—To accompany Course 3. Lectures on the chemical composition and action of the tissues and secretions of the animal body, the digestion of foods, and the elimination of waste products. (Course 11 in the Department of Chemistry.)

3 units, 3d semester (SWAIN) MWF 11:15-12:15

[Students enrolled as Medical students will be required to deposit \$10 breakage fee for the laboratory course in Physiological Chemistry. Other University students will pay the usual fee of \$25.]

IV. DIVISION OF HYGIENE AND PUBLIC HEALTH

WILLIAM FREEMAN SNOW, Clinical Professor.

RICHARD G. BRODRICK, Assistant Clinical Professor.

WILFRED H. KELLOGG, Clinical Instructor.

Hygiene.—This course is divided as follows:

- (a) Required reading, covering the usual information essential to an understanding of the principles of public health and hygiene;
- (b) Lectures on organized public health work, covering the administration of federal, state, and local health departments (1st semester);

(c) Lectures on Medical Sociology, covering the activities of various types of welfare organizations (2d semester).

The practicing physician's duties and opportunities in the field of preventive medicine are emphasized and illustrated by field work at quarantine stations and health departments.

1 hour, 7th and 8th semesters (BRODRICK, KELLOGG) F

2. Public Health.—Research work for graduates, or for students registered as candidates for advanced degrees in the Medical Department, may be arranged in connection with investigations of the State Board of Health and the San Francisco Health Department (BRODRICK, KELLOGG)

V. DIVISION OF MEDICINE

ALBION WALTER HEWLETT (executive), Professor.

WILLIAM FITCH CHENEY, LANGLEY PORTER, ANDREW WILLIAM FOSTER, HOLT, Clinical Professors.

THOMAS ADDIS, Associate Professor.

HARRY EVERETT ALDERSON, HAROLD PHILLIPS HILL, Associate Clinical Professors.

ERNEST CHARLES DICKSON, WALTER WHITNEY BOARDMAN, HARRIS KNIEST FABER, Assistant Professors.

FLORENCE MABEL HOLSCLOW, WALTER FRANK SCHALLER, JULIAN M. WOLFSOHN, HARRY REEVES OLIVER, HENRY HERBERT YERINSON, Assistant Clinical Professors.

GEORGE DE FOREST BARNETT, Instructor.

WILLIAM REDWOOD PRICE CLARK, GEORGE DUNLAP LYMAN, ARTHUR ALOYSIUS O'NEILL, Clinical Instructors.

WILLIAM LOUIS ADAMS, WILLIAM WALLACE BEHLOW, EDMUND BURTON, CHARLES HENRY CHRISTAL, MILLCENT COSGRAVE, AMELIA L. G. MAUD NOBLE HAVEN, ANTHONY HUFFAKER, THOMAS GEORGE MAN, WILLIAM KENNEY, CHARLES NELSON LEACH, HENRY GEORGE MEHRTEUS, PHILIP HALE PIERSON, ALFRED C. REED, CHESTER DURBIN SEWALL, ROLAND BEATTY TUPPER, Assistants.

ARTHUR JOHN RITTER, Lecturer on Mental Deficiency.

SUBDIVISIONS

PEDIATRICS	JURISPRUDENCE	ACTINOGRAPHY
NEUROLOGY	DERMATOLOGY AND SYPHILIS	TROPICAL MEDICINE
PSYCHIATRY	ELECTROTHERAPY	DIETETICS

The instruction in Medicine begins in San Francisco in the first semester, with practical work in Physical Diagnosis, with lectures

demonstrations in Physical Therapeutics, and with recitations in Medicine and laboratory work in Clinical Pathology. In the fifth and sixth semesters the general field of Medicine is covered by means of clinics, practical demonstrations, bedside instruction and clinical laboratory work. As far as feasible theoretical and didactic teaching is made secondary to demonstrations and individual work on the part of students. Four hours of the required work in Medicine may be taken in bedside instruction or in advanced work in the subdivisions of Neurology, Dermatology and Syphilis, or Pediatrics. During either the seventh or eighth semesters the student will, in the mornings, attend the clinics at the San Francisco Hospital. Therapeutics will be taught in immediate connection with Medicine.

1. **Physical Diagnosis and Introduction to Medicine.**—This course lays the foundation for the work in Medicine, and consists largely of practical instruction in the methods of physical diagnosis and in history taking, and in work upon the principles of medicine.

7 hours, 4th semester (HEWLETT, ADDIS, BOARDMAN, BARNETT,
DICKSON, REED) MF 9-10:30, TTh 9-11

2. **Clinical Pathology.**—A laboratory period of three hours per week, with some lectures, in microscopical and clinical diagnosis, including the methods of examining blood, urine, sputum, gastric contents, feces, etc.

3 hours, 4th semester (BARNETT) S 9-12

3. **Physical Therapeutics.**—In this course is given a practical discussion, with demonstrations, of various methods aside from drugs, for the treatment of disease, with particular reference to the physiological problems involved. Hydrotherapy, Balneotherapy, Climatology, Electrotherapy, Bier's Hyperaemia, Gymnastics, and Massage are considered. The technique of venesection, hypodermoclysis, transfusion, etc., is demonstrated.

2 hours, 4th semester (HEWLETT, ADDIS, BARNETT, BOARDMAN,
DICKSON) TTh 11-12

4. **Experimental Medicine and Clinical Pathology.**—Throughout a year the third-year class spends two hours per week in laboratory work in Experimental Medicine with demonstrations of pathological physiology, and in advanced Clinical Pathology.

2 hours, 5th and 6th semesters (ADDIS, HEWLETT, BARNETT,
BOARDMAN, DICKSON) M 2-4

5. Medicine: Section Work and Clinics.—Four mornings per week two hours are spent by students in the outpatient department or wards in practical medical work and in attending clinics and recitations.

8 hours, 5th semester (HEWLETT, CHENEY, ADDIS, BOARDMAN, DICKSON) MWThF 9-11

6. Medicine: Clinics.—Four hours per week of bedside instruction in the wards of Lane Hospital.

4 hours, 6th semester (HEWLETT, CHENEY, ADDIS, BOARDMAN) WTh 9-11

7. Medicine: Set Clinic.—Once a week a set clinic for the third- and fourth-year students is given at Lane Hospital.

1 hour, 5th, 6th and 7th, or 8th semesters (HEWLETT) Th 11-12

8. Medicine: Ward Work (Lane Hospital).—This consists of four hours per week of bedside work in Lane Hospital. [The senior class is divided into two sections. Section I is assigned to Lane Hospital for the 7th semester, and Section II for the 8th semester.] Instead of this course four hours in Medicine 11, 15, 21, 24 may be taken at the option of the student.

4 hours, 7th or 8th semester (HEWLETT, CHENEY) WTh 9-11

9. Medicine: Ward Work and Clinics (San Francisco Hospital).—Five hours are given to bedside instruction and there is a set Medical clinic on Saturday forenoon. [The senior class is divided into two sections. Section II is assigned to the San Francisco Hospital for the mornings of the 7th semester, Section I for the 8th semester.]

6 hours, 7th or 8th semester (HILL)

T 8:30-10:30, Th 9-11, WS 9-10

10. Actinography.—Practical instruction in the Roentgen-Ray laboratory of Lane Hospital including Radio-Therapy and plate interpretation.

(I) 1 hour, 7th semester; (II) 1 hour, 8th semester (BOARDMAN) T 8-9

10a. Actinography.—Practical instruction in Fluoroscopy in the Roentgen Ray Laboratory of Lane Hospital.

(I) ½ hour, 7th semester; (II) ½ hour, 8th semester (BOARDMAN)

W 1:30-2

11. Actinography.—Advanced course upon the technique of Roentgen-Ray examinations, with a clinical study of patients from the standpoint of X-Ray examinations.

2 hours, 7th or 8th semester (optional) (BOARDMAN)

12. **Diseases of the Nervous System.**—Recitations and demonstrations in the outpatient clinic.
1 hour, 5th semester (SCHALLER) MT 9-10
13. **Neurology.**—Recitations and clinical work in Lane Hospital and the out-patient department.
2 hours, 6th semester (SCHALLER) MT 9-10
14. **Neurology (San Francisco Hospital).**—Two hours per week are assigned for the clinical study of the neurological cases in the Stanford wards at this hospital.
(I) 2 hours, 7th semester; (II) 2 hours, 8th semester (WOLFSOHN)
WS 10-11
15. **Neurology.**—Advanced work in the outpatient department, laboratory and hospitals, for students who have had courses 12 and 13 or their equivalent. Optional.
2 to 4 hours, MWTh mornings (SCHALLER)
16. **Psychiatry.**—A weekly lecture course preceded by a clinic with demonstration of mental cases in the Stanford ward and from the out-patient department.
1½ hours, 7th semester (HOISHOLT) M 2:30-4
17. **Psychiatry.**—Continuation of the weekly mental clinic followed by a course of advanced lectures.
1½ hours, 8th semester (HOISHOLT) M 2:30-4
18. **Pediatrics.**—Recitation and clinical work in the outpatient department.
2 hours, 5th semester (FABER, PORTER, YERINGTON)
M 11-12, T 1:30-2:30
19. **Pediatrics.**—Recitations covering the general field of Pediatrics, and clinical work in the outpatient department and in Lane Hospital.
5 hours, 6th semester (FABER, PORTER, YERINGTON, HOLSCRAW, LYMAN)
M 11-12, F 9-11, 2-3, T 1:30-2:30
20. **Pediatrics.**—Clinical work in Lane Hospital.
2 hours, 7th semester (FABER, PORTER, YERINGTON, HOLSCRAW, LYMAN) S 10-12
21. **Pediatrics.**—Advanced work in the outpatient clinic and in Lane Hospital. Optional.
2 to 6 hours, MWTh mornings (FABER, YERINGTON)
22. **Dermatology and Syphilis.**—Two weekly clinical demonstrations and quizzes in the out-patient department of Lane Hospital. This includes a study of the histo-pathology of the skin and special

the instructor these subjects. The topics for discussion are illustrated with pathological specimens, clinical histories, manikin demonstrations, etc. For twelve periods the class is divided into three sections for instruction in pelvimetry and manikin exercises.

2 hours, 5th and 6th semesters (SPALDING, STEPHENSON, ———)
MF E

2. Lecture and Demonstration Course.—Covering the subjects Obstetrics and Gynecology, supplementary to course 1.

1 hour, 5th and 6th semesters, elective (SPALDING) W E

3. Histology and Ward Rounds.—The class is divided into two sections. These sections alternate for one-half the year in bedside instruction in the obstetrical ward and instruction in the histology of the female genital tract and the histologic changes induced by pregnancy.

1 hour, 5th and 6th semesters (SPALDING, STEPHENSON) W E

4. Practical Obstetrics.—For periods of two weeks, the senior student is detailed for his entire time as assistant on Out-patient Obstetrics. During this period he lives in the Women's Clinic and takes histories, examines ante-partum and post-partum patients, attends on patients in labor, assists the interne with ward patients in labor, witnesses operations, makes daily rounds in the hospital wards, visits home patients during the puerperal period, and is responsible for certain routine laboratory work.

4 hours, 7th or 8th semester (————)

5. Practical Gynecology.—In this course the class is divided in three sections. Instruction is given in history taking, pelvic examinations, cystoscopic examinations, and non-operative treatment in the dispensary; ward rounds; pathological exercises in the laboratory. Groups of four students are detailed in rotation for instruction in the operating room.

2 hours, 7th and 8th semesters (SPALDING, STEPHENSON, ———)
W 2-3, F 1:30-2;

6. Clinical Conference.—Students assisting in operations in course 5 are required to present one month after such experience a complete study of their patient, with a short review of the recent literature bearing upon the condition for which the patient was operated. The papers are discussed by the clinical staff and members of the senior class.

1 hour, 7th and 8th semesters (SPALDING, and clinical staff)
M 1:30-2;

7. **Special Courses in Cystoscopy, in Gynecological Diagnosis, and in Practical Obstetrics,** will be arranged for individual students. The Women's Clinic and the laboratory of Obstetrics and Gynecology are open throughout the year to properly qualified students who wish to work in Obstetrics and Gynecology.

VII. DIVISION OF PATHOLOGY

WILLIAM OPHÜLS, Professor.

CHARLES HERVEY BAILEY, Assistant Professor.

JEAN REDMAN OLIVER, Instructor.

1. **General Pathology.**—A course of lectures, demonstrations, and laboratory work which, following a general introduction into the field of Pathology, covers disturbances in circulation, regressive and progressive tissue changes, inflammation, and tumors. The study of human material will be supplemented by experiments. Two lectures and three laboratory periods of two and a half hours per week.

9½ hours, 4th semester (OPHÜLS, BAILEY, OLIVER)

MWF 1:30-4; TTh 8-9

2. **General Pathology.**—An elective course of weekly recitations covering the same ground as course 1.

1 hour per week (elective), 4th semester (BAILEY)

3. **Special Pathology.**—A course of demonstrations of fresh and preserved, gross and microscopic specimens illustrating selected chapters of Gross Morbid Anatomy. Part of the time will be devoted to the technique of post-mortem examinations. Diagnostic work will be done in the 6th semester.

4 hours per week, 5th and 6th semesters (OPHÜLS, BAILEY, OLIVER)

Th 2-4; S 10-12

4. **Advanced Work in Special Pathology.**—An elective course in Special Pathology is offered to students who have taken course 1. Students taking this course will assist at necropsies whenever possible. They are required to work up the histological or bacteriological problems connected with the necropsies which they attend. For this work they will be given the facilities of the laboratory.

(Elective) (OLIVER)

5. **Experimental Pathology.**—An elective course open to students who have completed General Pathology (course 1). In this course infectious diseases will be taken up from an experimental point of view, and special attention will be given to those which are common to man

the instructor these subjects. The topics for discussion are illustrated with pathological specimens, clinical histories, manikin demonstrations, etc. For twelve periods the class is divided into three sections for instruction in pelvimetry and manikin exercises.

2 hours, 5th and 6th semesters (SPALDING, STEPHENSON, ———)
MF 8-

2. Lecture and Demonstration Course.—Covering the subjects of Obstetrics and Gynecology, supplementary to course 1.

1 hour, 5th and 6th semesters, elective (SPALDING) W 8-

3. Histology and Ward Rounds.—The class is divided into two sections. These sections alternate for one-half the year in bedside instruction in the obstetrical ward and instruction in the histology of the female genital tract and the histologic changes induced by pregnancy.

1 hour, 5th and 6th semesters (SPALDING, STEPHENSON) W 3

4. Practical Obstetrics.—For periods of two weeks, the senior student is detailed for his entire time as assistant on Out-patient Obstetrics. During this period he lives in the Women's Clinic and takes histories, examines ante-partum and post-partum patients, attends obstetrical patients in labor, assists the interne with ward patients in labor, witnesses operations, makes daily rounds in the hospital wards, visits home patients during the puerperal period, and is responsible for certain routine laboratory work.

4 hours, 7th or 8th semester (———)

5. Practical Gynecology.—In this course the class is divided into three sections. Instruction is given in history taking, pelvic examinations, cystoscopic examinations, and non-operative treatment in the dispensary; ward rounds; pathological exercises in the laboratory. Groups of four students are detailed in rotation for instruction in the operating room.

2 hours, 7th and 8th semesters (SPALDING, STEPHENSON, ———)
W 2-3, F 1:30-2:30

6. Clinical Conference.—Students assisting in operations in course 5 are required to present one month after such experience a complete study of their patient, with a short review of the recent literature bearing upon the condition for which the patient was operated. These papers are discussed by the clinical staff and members of the senior class.

1 hour, 7th and 8th semesters (SPALDING, and clinical staff)
M 1:30-2:30

7. **Special Courses in Cystoscopy, in Gynecological Diagnosis, and in Practical Obstetrics,** will be arranged for individual students. The Women's Clinic and the laboratory of Obstetrics and Gynecology are open throughout the year to properly qualified students who wish to work in Obstetrics and Gynecology.

VII. DIVISION OF PATHOLOGY

WILLIAM OPHÜLS, Professor.

CHARLES HERVEY BAILEY, Assistant Professor.

JEAN REDMAN OLIVER, Instructor.

1. **General Pathology.**—A course of lectures, demonstrations, and laboratory work which, following a general introduction into the field of Pathology, covers disturbances in circulation, regressive and progressive tissue changes, inflammation, and tumors. The study of human material will be supplemented by experiments. Two lectures and three laboratory periods of two and a half hours per week.

9½ hours, 4th semester (OPHÜLS, BAILEY, OLIVER)

MWF 1:30-4; TTh 8-9

2. **General Pathology.**—An elective course of weekly recitations covering the same ground as course 1.

1 hour per week (elective), 4th semester (BAILEY)

3. **Special Pathology.**—A course of demonstrations of fresh and preserved, gross and microscopic specimens illustrating selected chapters of Gross Morbid Anatomy. Part of the time will be devoted to the technique of post-mortem examinations. Diagnostic work will be done in the 6th semester.

4 hours per week, 5th and 6th semesters (OPHÜLS, BAILEY, OLIVER)

Th 2-4; S 10-12

4. **Advanced Work in Special Pathology.**—An elective course in Special Pathology is offered to students who have taken course 1. Students taking this course will assist at necropsies whenever possible. They are required to work up the histological or bacteriological problems connected with the necropsies which they attend. For this work they will be given the facilities of the laboratory.

(Elective) (OLIVER)

5. **Experimental Pathology.**—An elective course open to students who have completed General Pathology (course 1). In this course infectious diseases will be taken up from an experimental point of view, and special attention will be given to those which are common to man

and animals, or which may produce lesions in animals. Students will have an opportunity to watch the development of such diseases in animals, and the lesions will be studied at autopsy. Methods in common use for the diagnosis of infectious diseases by means of laboratory experiments will be taken up.

2 hours per week (elective), one semester (BAILEY)

6. Research Work in the Pathological Laboratory.—Students wishing to do special work in the Pathological Laboratory should have finished course 1. They should consult with the executive of the Division in regard to the selection of a proper subject for investigation. As the laboratory accommodations are limited, students must do a reasonable amount of work, otherwise the privilege will be withdrawn. A deposit of \$10 will be required to cover such material as is used by the student in the course of his work. Such part of this as is not drawn against will be refunded on the completion of the work undertaken. Work may be undertaken during the summer vacation. The same regulations apply to work on theses or for advanced degrees in the Division, except that in the latter case the student also should have finished course 3.

(OPHÜLS)

VIII. DIVISION OF PHARMACOLOGY

ALBERT CORNELIUS CRAWFORD, Professor.

_____, _____, Assistants.

1. Pharmacology and Materia Medica.—In the course in Pharmacology emphasis is placed on laboratory work. This requires three hours weekly during the fourth semester. In this course the student performs for himself, or has demonstrated to him by the other members of the class, the important experiments which illustrate the fundamental principles of pharmacology, and sees one or more experiments on all of the more important drugs. The relation of the laboratory work to rational therapeutics is constantly kept in mind. The lecture course embraces two hours weekly during the fourth semester, with one weekly conference or demonstration. During the fifth semester the work consists of lectures and recitations. In connection with the course in Pharmacology a short course in prescriptive writing is given.

(a) 6 hours, 4th semester; (b) 3 hours, 5th semester. (CRAWFORD)

(a) T 1:30-4:30, W 9-10:30, Th 1:30-3; (b) WF 1:30

2. Graduate Course.—The laboratory is open throughout the year to properly qualified students who wish to carry on independent work in Pharmacology.

(CRAWFORD)

3. Pharmacy.—A short optional course of demonstrations in pharmacy will be given. This will enable the student to understand better the advantages and dangers of combining drugs.

(—)

IX. DIVISION OF PHYSIOLOGY

OLIVER PEEBLES JENKINS, Professor, Emeritus.

ERNEST GALE MARTIN (executive), FRANK MACE MCFARLAND, Professors.

CLARA S. STOLTENBERG, Associate Professor.

JAMES ROLLIN SLONAKER, FRANK WALTER WEYMOUTH, Assistant Professors.

1. Physiology of Muscle and Digestion.—An experimental course covering the ground represented in Foster's Physiology, or Howell's Text-book on the same subjects. (Two lecture and five laboratory hours per week.) [Course 2 in the Department of Physiology and Histology.]

4 units, 1st semester (MARTIN, SLONAKER)

2. Physiology of Blood and Circulation, Respiration, Elimination of Wastes, Metabolism, and Nutrition.—Follows course 1. An experimental course, covering the ground represented in Howell's Text-book. (One lecture and five laboratory hours per week.) [Course 3 in the Department of Physiology and Histology.]

4 units, 2d semester (MARTIN, SLONAKER)

3. Structure of the Nervous System.—The course consists of the dissection and comparative study of a series of vertebrate brains, including the human brain and cord, also the peripheral nervous system; abundant material is provided, also such necessary helps as the latest models and charts. For texts the student will use Quain, Etinger, and Barker. (One lecture and five laboratory hours per week.)

3 units, 1st semester (STOLTENBERG)

4. Anatomy and Histology of the Sense Organs.—The course is planned to accompany course 3, the two being designed to give the gross and minute anatomy of the central nervous systems and sense organs. The texts necessary for the student's use are Quain and Barker. (One lecture and five laboratory hours per week.)

3 units, 2d semester (STOLTENBERG)

5. Histology.—The study of the structure of the cell and its modes of reproduction, the epithelial, muscular, nervous, and connective tissues, and the outline of their development in a comparative way, occupy the first semester. During the second semester the structure of the blood and lymph, and the microscopic anatomy of the organs, are dealt with. Text required: Quain-Schäfer's Microscopic Anatomy. Elementary histological technique is taught during the course. In the second semester an opportunity is offered for a limited number of students to register for an extra unit, which is devoted to more extended histological technique. Prerequisite for course 5, course 1 or its equivalent. (One lecture and five laboratory hours per week.)

3 units, both semesters (McFARLAND)

6. Physiology of the Nervous System and Sense Organs.—An experimental course in these subjects, designed to follow courses 3 and 4. Texts: Foster, Howell's Text-book. (One lecture and five laboratory hours per week.) [Course 6 in the Department of Physiology and Histology.]

3 units, 2d semester (WEYMOUTH)

7. Journal Club.—Students in the advanced classes will be expected to meet once a week to discuss current literature in Physiology and Histology. [Course 14 in the Department of Physiology and Histology.]

1 unit, 2d semester (DEPARTMENT FACULTY)

8. Advanced and Research Courses in Physiology and Histology are open to those who are qualified to take them up.

X. DIVISION OF SURGERY

ADOLPH BARKAN, Professor, Emeritus.

STANLEY STILLMAN (executive), EMMET RIXFORD, Professors.

LEONARD W. ELY, Associate Professor.

RUFUS LEE RIGDON, ALBERT BROWN MCKEE, EDWARD CECIL SEWALL,
Clinical Professors.

FRANK ELLSWORTH BLAISDELL, JOHN FRANCIS COWAN, LEO ELOSSE,
Assistant Professors.

HARRINGTON BIDWELL GRAHAM, Assistant Clinical Professor.

HANS BARKAN, JAMES EAVES, HARRY LESLIE LANGNECKER, HARVARD

YOUNG MCNAUGHT, GEORGE ROTHGANGER, FRANCIS THOMAS

WILLIAMS, GEORGE PRESTON WINTERMUTE, Clinical Instructors—

CAROLINE PALMER, Anaesthetist, Lane Hospital.

HOWARD FELIX ADLER, JOHN ROBERT BURROWS, JAMES ROOT DILLON, ARTHUR LAWRENCE FISHER, SYLVAN LEWIS HAAS, ROSS WALLACE HARBAUGH, CLARENCE ELMER HYDE, JOSIAH H. KIRK, PETER HARRISON LUTTRELL, WILLIAM O. MONTGOMERY, HAROLD STAATS MOORE, MELVILLE ERSKINE RUMWELL, EDMUND D. SHORTLIDGE, CHESTER HOWARD WOOLSEY, Assistants in Clinic.

SUBDIVISIONS

OPHTHALMOLOGY GENITO-URINARY DISEASES ORTHOPEDICS
OTOLOGY, RHINOLOGY, AND LARYNGOLOGY

Instruction in Surgery begins in the fourth semester, with recitations and demonstrations in General Surgery, *i. e.*, the principles of surgery, surgical pathology, and the surgical diseases, together with recitations and demonstrations in fractures and dislocations. The systematic textbook and lecture work in Regional Surgery is completed in the sixth semester. As far as possible clinical demonstrations will take the place of formal lectures. The work of the seventh and eighth semesters is essentially clinical, the general field being covered by means of clinics, practical demonstrations, bedside instruction, individual clinical investigation, and work in the laboratory of Surgical Pathology.

General Surgery (Surgical Pathology and Principles of Surgery).—Recitations, demonstrations, and laboratory work, utilizing clinical and pathological material from the outpatient clinics and Lane Hospital, and preparations from the museum and laboratory of Surgical Pathology.

2½ hours, 4th semester (STILLMAN, COWAN) MW 10:30-12

Fractures and Dislocations.—Recitations, study of X-Ray plates, and demonstrations of fractures and dislocations. All the important fractures and dislocations are produced on the cadaver and subsequently demonstrated by dissection.

2 hours, 4th semester (ELY, ELOESSER, BLAISDELL, COWAN) F 10:30-12

Regional Surgery.—Recitations and demonstrations in diseases of the extremities and certain affections of the head and neck.

2 hours, 4th semester (ELOESSER, COWAN) WF 4-5

Regional Surgery.—Recitations, demonstrations, and discussions on diseases of the abdomen.

3 hours, 5th semester (STILLMAN) M 4-5, F 3-5

Regional Surgery.—Recitations, demonstrations, and discussions on diseases of the head, neck, and thorax not included in course

3, with special attention given to the surgery of the brain and spinal cord.

2 hours, 6th semester (RUXFORD) MF 4-

6. Surgical Pathology.—A laboratory course in which surgical problems are considered from the standpoint of Pathology. Special attention is given to the study of tumors and gross specimens from the out-patient clinic and hospital operating rooms.

2 hours, 5th and 6th semesters (ELY, COWAN, BLAISDELL)

T 2:30-4:

7. Surgical Clinics and Section Work.—In this course operative clinics are given twice a week in the amphitheatre, quizzes and demonstrations in the out-patient clinics, and bedside instruction and histology taking in the surgical wards of Lane Hospital. As far as practical the operative clinics are limited to cases which have been previously studied by the student either in the medical or surgical wards or the out-patient clinics. *Anesthetics.*—In connection with the clinical work the students are assigned in rotation so that each one shall administer ten anesthetics under the supervision of Dr. Caroline Palmer, the anesthetist at Lane Hospital. Dr. Palmer also gives a course of four lectures on the administration of anesthetics.

5 hours, 5th semester; 4 hours, 6th semester (STILLMAN, COWAN, ROTHGANGER) T 10-11, TWF 11-12, S 8:30-9

8. Surgery: Ward Work and Clinics.—Out-patient Clinics and Lane Hospital. (The senior class is divided into two sections. Section I is assigned to Lane Hospital for the mornings of the 7th semester and Section II for the mornings of the 8th semester.) Formal clinics are given once per week. Senior students are privileged to assist operations and in the dressing of cases both in the out-patient clinics and hospital wards. One hour per week of this course may be devoted to courses 13, 14, 15, 16, 17, 18, at the option of the student.

3 hours, 7th or 8th semester (STILLMAN) T 10-12, S 8:30-9:

9. Surgery: Ward Work and Clinics.—San Francisco Hospital. (Section II of the senior class is assigned to the San Francisco Hospital for the mornings of the 7th semester and Section I for the mornings of the 8th semester.) Three hours per week are spent either in the wards or operating room, and there is a set surgical clinic once per week. One hour per week of this course may be devoted to optional courses in Surgery.

4 hours, 7th or 8th semester (RUXFORD, ELOESSER, RUMWELL, HARBAUGH) MF 8:30-10:30

10. Ophthalmology.—Demonstrations, lectures, recitations, and clinics. This course covers in a practical way the general field of diseases of the eye. Instruction is given in the use of the ophthalmoscope, perimeter, etc. Operations are performed both in Lane Hospital and the out-patient clinic.

2 hours, 7th and 8th semesters (McKEE, BARKAN) Th 2-4

11. Otology, Rhinology, and Laryngology.—Demonstrations, recitations, and clinics. The diseases of the ear, nose, and throat are covered in a general way, and the practical use of the important diagnostic instruments is taught. Operations are performed both in the amphitheatre and in the outpatient clinic.

2 hours, 7th and 8th semesters
(SEWALL, GRAHAM, WINTERMUTE, McNAUGHT) Th 2-4

12. Genito-Urinary Surgery.—Recitations, quizzes, and clinics.—This course includes practical work in the out-patient clinic and training in the use of the urethroscope and cystoscope. Special attention is devoted to investigation of the upper urinary tract. Operative clinics are held once a week.

3 hours, 7th or 8th semester (RIGDON, WILLIAMS) MF 8:30-10

13. Orthopedic Surgery.—Clinics and demonstrations. This course covers the general field of Orthopedic Surgery, and is given in Lane Hospital and in the outpatient department.

2 hours, 7th or 8th semester (ELY) F 10-12

14. Operative Clinic.—An operative clinic for senior students and qualified physicians is held once per week. Optional.

2 hours, 7th and 8th semesters (STILLMAN)

15. Out-patient Clinics.—In this course opportunity is afforded senior students and qualified physicians of examining cases and of doing dressings, bandaging, and minor operations in the outpatient clinic under instruction of the Assistants. Optional.

Three mornings per week, 7th and 8th semesters

(ROTHGANGER, HYDE, ADLER)

16. Operative Surgery.—A course of operative surgery on the cadaver in which the student performs or assists in performing most of the classical surgical operations. Optional.

7th or 8th semester (EAVES)

17. Refraction.—A practical course in Physiological Optics and Refraction open to senior students and physicians. Optional.

1 hour, 7th or 8th semester (McKEE)

3, with special attention given to the surgery of the brain and spinal cord.

2 hours, 6th semester (RIXFORD)

MF 4-5

6. Surgical Pathology.—A laboratory course in which surgical problems are considered from the standpoint of Pathology. Special attention is given to the study of tumors and gross specimens from the out-patient clinic and hospital operating rooms.

2 hours, 5th and 6th semesters (ELY, COWAN, BLAISDELL)

T 2:30-4 =30

7. Surgical Clinics and Section Work.—In this course operations in the out-patient clinics are given twice a week in the amphitheatre, quizzes and demonstrations in the out-patient clinics, and bedside instruction and history taking in the surgical wards of Lane Hospital. As far as practicable the operative clinics are limited to cases which have been previously studied by the student either in the medical or surgical wards or in the out-patient clinics. *Anesthetics.*—In connection with the clinical work the students are assigned in rotation so that each one shall administer ten anesthetics under the supervision of Dr. Caroline Palmer, the anesthetist at Lane Hospital. Dr. Palmer also gives a course of four lectures on the administration of anesthetics.

5 hours, 5th semester; 4 hours, 6th semester (STILLMAN,

COWAN, ROTHGANGER)

T 10-11, TWF 11-12, S 8:30-9:30

8. Surgery: Ward Work and Clinics.—Out-patient Clinics and Lane Hospital. (The senior class is divided into two sections. Section I is assigned to Lane Hospital for the mornings of the 7th semester, and Section II for the mornings of the 8th semester.) Formal clinics are given once per week. Senior students are privileged to assist in operations and in the dressing of cases both in the out-patient clinics and hospital wards. One hour per week of this course may be devoted to courses 13, 14, 15, 16, 17, 18, at the option of the student.

3 hours, 7th or 8th semester (STILLMAN) T 10-12, S 8:30-9:30

9. Surgery: Ward Work and Clinics.—San Francisco Hospital—(Section II of the senior class is assigned to the San Francisco Hospital for the mornings of the 7th semester and Section I for the mornings of the 8th semester.) Three hours per week are spent either in the wards or operating room, and there is a set surgical clinic once per week. One hour per week of this course may be devoted to optional courses in Surgery.

4 hours, 7th or 8th semester

(RIXFORD, ELOESSER, RUMWELL, HARBAUGH)

MF 8:30-10:30

10. Ophthalmology.—Demonstrations, lectures, recitations, and clinics. This course covers in a practical way the general field of diseases of the eye. Instruction is given in the use of the ophthalmoscope, perimeter, etc. Operations are performed both in Lane Hospital and the out-patient clinic.

2 hours, 7th and 8th semesters (McKEE, BARKAN) Th 2-4

11. Otology, Rhinology, and Laryngology.—Demonstrations, recitations, and clinics. The diseases of the ear, nose, and throat are covered in a general way, and the practical use of the important diagnostic instruments is taught. Operations are performed both in the amphitheatre and in the outpatient clinic.

2 hours, 7th and 8th semesters
(SEWALL, GRAHAM, WINTERMUTE, McNAUGHT) Th 2-4

12. Genito-Urinary Surgery.—Recitations, quizzes, and clinics.—This course includes practical work in the out-patient clinic and training in the use of the urethroscope and cystoscope. Special attention is devoted to investigation of the upper urinary tract. Operative clinics are held once a week.

3 hours, 7th or 8th semester (RIGDON, WILLIAMS) MF 8:30-10

13. Orthopedic Surgery.—Clinics and demonstrations. This course covers the general field of Orthopedic Surgery, and is given in Lane Hospital and in the outpatient department.

2 hours, 7th or 8th semester (ELY) F 10-12

14. Operative Clinic.—An operative clinic for senior students and qualified physicians is held once per week. Optional.

2 hours, 7th and 8th semesters (STILLMAN)

15. Out-patient Clinics.—In this course opportunity is afforded senior students and qualified physicians of examining cases and of doing dressings, bandaging, and minor operations in the outpatient clinic under instruction of the Assistants. Optional.

Three mornings per week, 7th and 8th semesters

(ROTHGANGER, HYDE, ADLER)

16. Operative Surgery.—A course of operative surgery on the cadaver in which the student performs or assists in performing most of the classical surgical operations. Optional.

7th or 8th semester (EAVES)

17. Refraction.—A practical course in Physiological Optics and Refraction open to senior students and physicians. Optional.

1 hour, 7th or 8th semester (McKEE)

18. Advanced Ophthalmology.—Clinical work in the Outpatient Clinic and Lane Hospital open to senior students and physicians. Optional.

2 to 6 hours, 7th or 8th semester (McKEE)

19. Advanced Otology, Rhinology, and Laryngology.—Clinical instruction for advanced students, including surgical operations. Optional.

2 to 4 hours, 8th semester (SEWALL, GRAHAM, McNAUGHT)

In connection with the above course, through the co-operation of the various clinics and laboratories, opportunity is offered advanced students and physicians to make a special study of functional tests of the ear, tubercular lesions of the larynx, anatomy of the ear, nose and throat, special bacteriology of the upper respiratory tract, Roentgen Ray diagnostic methods, and of performing operations upon cadaver.

(SEWALL, GRAHAM, WINTERMUTE, MOORE, BLAISDELL, DICK BOARDMAN)

20. Special courses will be offered to well trained physicians in the laboratory of Surgical Pathology and in the out-patient clinic hospitals. Such students may register for advanced degrees of Special Workers.

(STILLMAN, RIXFORD, BLAISDELL, ELY, COWAN)

MARINE BIOLOGICAL LABORATORY

Professors CHARLES HENRY GILBERT and OLIVER PEEBLES JENKINS
Directors.

The Laboratory buildings are located at Pacific Grove, two miles west of Monterey, and stand on a low bluff immediately facing the sea. They consist of two two-story structures capable of accommodating about eighty students, and contain four general laboratories, lecture-room, seventeen private rooms for special investigators, and a dark-room for photography. They are provided with running water both salt and fresh, and ample provision is made for individual aquaria. The library and apparatus of the University are available for use in the Laboratory.

SESSION OF 1916

Associate Professor JOHN OTTERBEIN SNYDER, Instructor in Charge

The Twenty-fifth Session will extend over a period of six weeks, beginning May 22d and closing July 1st.

COURSES OF INSTRUCTION

General Zoology.—A course of laboratory work, lectures, and field excursions, designed to illustrate the structure, life history, habits, and relationships of the principal groups of animals. Open to all students.

Embryology.—A study of the early development of the embryos of invertebrate and vertebrate animals, including practice in the preparation of material. For students who have had either elementary Zoology or Physiology.

Provision will also be made for a limited number of students who are prepared to undertake advanced work in Zoology.

The sessions of the Marine Laboratory form a part of the biological work of Stanford University. Students who register at Pacific Grove, and satisfactorily complete the prescribed work, receive six units of University credit.

EXPENSES.—A laboratory fee of twenty-five dollars is payable in advance. To investigators engaged in research, the use of the laboratory is offered free of charge.

Pacific Grove is a quiet seaside resort, well supplied with hotels and cottages, where no difficulty is experienced in obtaining boarding accommodations with a considerable range in price.

UNIVERSITY LIBRARY

GEORGE THOMAS CLARK, Librarian.

HELEN BINNINGER SUTLIFF, Chief Cataloguer.

ALICE NEWMAN HAYS, Reference Librarian.

CHARLES V. PARK, Chief of Loan Desk.

ELIZABETH HADDEN, Chief of Order Department.

LUCIA MAY BROOKS, Chief of Serial Department.

LOUISE OPHÜLS, Medical Librarian.

The Library is housed in the Thomas Welton Stanford Library Building, which forms the central portion of the easterly half of the outer quadrangle façade. On the main floor are the general reading rooms, with accommodations for 220 readers, the reference room, serial room, and catalogue room. On the second floor are six seminary rooms, used exclusively by the Departments of Economics, English Literature, Germanic Languages, Greek, Latin, and History.

The Library is open during term time on week days from 8 a.m. to 10 p.m., except on Saturdays, when it is closed at 5:00 p.m. During vacations the hours are from 8:30 a.m. to 4:30 p.m., Saturdays to 12:30 p.m. The shelves are open to members of the faculty, and to students engaged in advanced work upon the recommendation of their instructors. Books, other than works of reference, not required for class use, are lent for a period of two weeks.

Including the departments of Law and Medicine the Library contains upward of 273,000 volumes. The income of the Jane Lathrop Stanford Jewel Fund, certain other special funds, and fees provide amply for its maintenance and growth. Noteworthy special collections are as follows:

THE JORDAN LIBRARY OF ZOOLOGY.—A collection consisting largely of works on ichthyology, to a considerable extent made up of a vast number of authors' separates, which have been accumulated by Chancellor JORDAN, bound in convenient form, indexed, and catalogued. The more voluminous publications, such as the works of Cuvier, Lacépède, Bloch, Bleeker, Gunther, and others, are well represented. These, supplemented by the proceedings of various societies and institutions, make a collection of books of great value to advanced students and investigators in ichthyology. The library is conveniently arranged, and is situated in the Zoology building near the laboratories and collections.

THE BARBARA JORDAN LIBRARY OF BIRDS.—A memorial collection presented by Chancellor JORDAN, and to which frequent additions are made. While some of the older texts are not represented, it is a good working library of ornithology and contains the principal modern works on the subject.

THE HOPKINS RAILWAY LIBRARY.—A collection of approximately 10,000 volumes and pamphlets dealing with the subject of transportation. In 1892 Mr. TIMOTHY HOPKINS, of San Francisco, presented to the University his private library on railroads, consisting of about 2,000 books, personally providing for its maintenance and growth for many years. At present there is an annual library appropriation for this purpose. The collection is shelved by itself in one of the seminary rooms. It is general in scope, intended to embrace all subjects touching on the building, maintenance, and operation of railways. It is especially rich in state and government reports, as well as in reports of individual railroads both in the United States and Europe, with much material pertaining to their history.

THE HILDEBRAND LIBRARY.—In 1895 the University acquired the library of the late Professor Hildebrand, of Leipzig, containing more than 5000 volumes and pamphlets relating largely to Germanic languages and literature, the seventeenth and eighteenth centuries being especially well represented, and including also a notable collection of three hundred old dictionaries. The value of the books is greatly enhanced by the manuscript notes of Professor Hildebrand.

THE FLÜGEL COLLECTION, which formed the more important part of Dr. Flügel's library, was purchased in 1915 and embraces about 4,000 volumes. It includes copies of the 15th century editions of Vincent of Beauvais, a number of important and rare 16th century writers (e. g., Ball's *Catalogus*, 1557-9; Luther, 1539-59; More, 1557; Holinshed, 1586), and a good many 17th century 4tos and folios (Islip's Chaucer, Selden, Browne, Stow, etc.). The history of philology is well illustrated (Spelman, Junius, Hicks, et al.). The library has now a solid foundation in these fields and can supply a large amount of material for the study of certain aspects of the 16th and 17th centuries that could not formerly be attempted.

THE THOMAS WELTON STANFORD AUSTRALASIAN LIBRARY.—A good working collection of books relating to Australia and New Zealand. It is especially rich in early voyages, travels, and descriptions. Several hundred volumes of parliamentary reports of the Australian states, the Commonwealth, and New Zealand, are included. The publications of learned societies, such as the Royal Societies of New South Wales and Victoria, the Australian Museum, and the New Zealand Institute, are well represented, while considerable pamphlet material also is available.

BRITISH PARLIAMENTARY PAPERS.—An unusually complete set of British government documents from 1801 to date, some 6500 volumes, of which the first 3500 volumes constituted a special gift to the Library, made by Mrs. Stanford in 1900. The set contains not only the full papers laid before Parliament from the customary departments of government, such as diplomatic, colonial, and financial papers, but also the most valuable reports of the special committees and royal commissions, offering material for research in almost every field of knowledge. Taken in connection with the University's excellent set of United States Documents, and of the governmental publications of Canada, and of Australasia, the collection offers unusual facilities for study in the public undertakings of English-speaking peoples.

THE JARBOE COLLECTION ON THE FRENCH REVOLUTION.—Acquired in 1910. It contains original materials, principally in French, relating to

the Revolutionary and Napoleonic era. Two features of the collection are of particular interest to advanced students of history—the original and contemporaneously printed pamphlets, of which many are unusual; and the memoirs, of which there is a comprehensive selection.

THE LAW LIBRARY.—A library of about 21,000 volumes, selected with care and adequate for the study of English and American law. It contains practically complete sets of the reports of the courts of England, Scotland, Ireland, Canada, the United States and the several states, together with a valuable collection of statutes, treatises and periodicals.

THE LANE MEDICAL LIBRARY.—Founded by the directors of Cooper Medical College in accordance with the bequest of Mrs. L. C. Lane. The Library contains about 40,000 volumes, and is particularly rich in its collection of medical and allied periodicals. The leading domestic and foreign journals are currently received. The new library building, erected in 1912, is a fireproof structure of Colusa sandstone, and is located opposite the other medical buildings, on the corner of Sacramento and Webster streets, San Francisco.

THE BRANNER GEOLOGICAL LIBRARY.—The Geological Library (room 333) is the result of twenty-five years of painstaking acquisition by Dr. John Casper Branner. It includes a vast wealth of material relating to geology, paleontology, mineralogy, geography, mining and metallurgy. It is especially well equipped with files of journals and the transactions of scientific societies, together with a large collection of state and government reports. This library was acquired by the University in 1914. Information as to its journals and other sets is available at the Reference desk.



LELAND STANFORD JUNIOR UNIVERSITY
SECOND SERIES BULLETIN NUMBER 98

DEPARTMENT OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY

ANNOUNCEMENT OF COURSES
1917-18

MAY, 1917

PUBLISHED BY THE UNIVERSITY
STANFORD UNIVERSITY, CALIFORNIA

UNIVERSITY BULLETINS

THE UNIVERSITY REGISTER. Published in February.

ANNOUNCEMENT OF THE SCHOOL OF LAW. Published in March.

ANNOUNCEMENT OF THE SCHOOL OF MEDICINE. Published in April.

ANNOUNCEMENT OF COURSES OF INSTRUCTION for 1917-18 with schedule of Lectures and Laboratory Work. Published in May.

ANNOUNCEMENT OF GRADUATE INSTRUCTION. Published in June.

INFORMATION CIRCULAR. Published in August.

SCHEDULE OF LECTURES AND LABORATORY WORK for 1917-18. Revised edition ready September 28. 10c.

DIRECTORY OF OFFICERS AND STUDENTS. Published in October, January, April and July. 15c.

Address, THE REGISTRAR,
Stanford University, California.

ALUMNI DIRECTORY, 1891-1910. Issued September, 1910. Price, 50c; postage, 15c. For sale at the Business Office.

THE WEEKLY CALENDAR. Published every Friday during term time. 25c per quarter. Address, President's Secretary.

UNIVERSITY PUBLICATIONS

UNIVERSITY SERIES

Monographs and other papers embodying the results of original research in the various departments of University activity.

CONTRIBUTIONS TO BIOLOGY

Reprinted from the Proceedings of the California Academy of Science.

OTHER PUBLICATIONS

Monographs issued 1892-95.

Address, THE LIBRARY,
Stanford University, California.

LELAND STANFORD JUNIOR UNIVERSITY

ANNOUNCEMENT OF COURSES
1917-18

PUBLISHED BY THE UNIVERSITY
STANFORD UNIVERSITY, CALIFORNIA

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UNIVERSITY CALENDAR

1917

AUTUMN QUARTER

Oct. 1 MondayRegistration for Autumn Quarter.
Oct. 2 TuesdayInstruction begins.
Nov. 29 Thursday
Dec. 2 Sunday} Thanksgiving Recess.
Dec. 19-21 Wednesday-Friday.....End Quarter Examinations.

1918

WINTER QUARTER

Jan. 2 WednesdayRegistration for Winter Quarter.
Jan. 3 ThursdayInstruction begins.
Feb. 22 FridayWashington's Birthday.
March 9 SaturdayFounders' Day.
Mar. 20-22 Wednesday-Friday.....End Quarter Examinations.

SPRING QUARTER

April 1 MondayRegistration for Spring Quarter.
April 2 TuesdayInstruction begins.
May 14 MondayBirthday of Leland Stanford, Junior.
June 11-13 Tuesday-Thursday.....End Quarter Examinations.
June 15 SaturdayAlumni Day.
June 16 Sunday.....Baccalaureate Sunday.
June 17 MondayCommencement.

SUMMER QUARTER

June 18 TuesdayRegistration for Summer Quarter.
June 19 WednesdayInstruction begins.
July 4 ThursdayIndependence Day.
Aug. 31 SaturdayWork closes in School of Medicine in
San Francisco.
Aug. 29-31 Thursday-Saturday.....End Quarter Examinations.

COURSES OF INSTRUCTION

ANATOMY

ARTHUR WILLIAM MEYER, FRANK MACE MCFARLAND, Professors.

CLARA S. STOLTENBERG, Associate Professor.

ELBERT CLARK, Acting Associate Professor.

EDGAR DAVIDSON CONGDON, Assistant Professor.

ERNEST RISLING, Technical Assistant.

REQUIRED COURSES

1. General Histology and Microscopic Anatomy.—A course dealing with the elementary structure and vital activities of the animal cell, the histology and development of the tissues and their combination into the organs of the Vertebrates, with especial reference to the Mammalia. Elementary histological technique is taught during the course. Open to students who have had a year's biological training, or its equivalent. (Three lectures and fifteen laboratory hours per week.)

8 units, autumn or spring quarters (MCFARLAND)

(Autumn) Lec. MWF 9; Lab. MWF 10-12, TTh 9-12, W 1:05-4:05;

(spring) Lec. MWF 11; Lab. MTWThF 1:05-4:05.

2. Osteology.—Students will be expected to familiarize themselves thoroughly, on their own initiative, with the surface anatomy of the bones of the skeleton. This individual work will be supplemented by the laboratory study of special aspects of the subject under the supervision of instructors. Not given as a separate course. Credit is included in the courses in dissection of which osteology forms a part.

(CONGDON) (Winter) M 9-12; (spring) M 1:05-4:05

3, 4, 5, Dissection of (3) the Head, Neck, and Thorax; (4) the Upper Extremity; (5) the Abdomen and Lower Extremity.—These courses are given simultaneously throughout the year and may be begun at any time. No one will be assigned to less than one of the above parts nor will credit be given for less, save by special arrangement.

8, 3, 6 units (respectively), autumn, winter, and spring quarters

(CLARK, CONGDON) (Autumn) Lab. MT 1:05-4:05, WF 9-12;

(winter) Lab. MTWThF 9-12; (spring) Lab. MTWThF 1:05-4:05

6. Neurology.—A study of the structure of the central nervous system of man by means of dissections and prepared slides, supplemented by dissections of the central nervous system of other mammals. Text required: Villiger's Brain and Spinal Cord.

5 units, autumn or winter quarters (STOLTENBERG)

Lec. ThFS 8; Lab. ThF 1:05-4:

OPTIONAL AND ADVANCED COURSES

7. Cytology.—The course deals with the structure and functions of the animal cell with special reference to the reproductive processes. Lectures, laboratory work, and assigned reading. Open to those who have had courses in Histology, Embryology, and Microscopic technique.

3 to 5 units, winter quarter (McFARLAND) MTWThF afternoon

8. Special Courses.—Advanced courses in Histology, Histogenesis, Microscopic Anatomy, Cytology, or Microscopic Technique will be planned to suit the needs of individual students. Open to those who have had courses in Histology and Embryology.

2 to 5 units, winter quarter (McFARLAND) MTWThF afternoon

9. Topographical Anatomy.—The work consists of the laboratory study of frozen sections of fetal, infantile, and adult cadavers made in various planes, and of dissected and specially injected preparations, supplemented by models and atlases. It is suggested that students who can afford the time supplement courses 3, 4, and 5 by the respective portions of course 9 immediately on completing the dissection of part. Open to students who have completed courses 2, 3, 4, and 5.

2 to 5 units, winter quarter (CLARK, CONGDON) By arrangement

10. Anatomy of the Sense Organs.—Dissections mainly. Text: Quain-Schäfer's Microscopic Anatomy, Quain's Sense Organs. (One lecture and five laboratory hours per week.)

2 units, autumn or winter quarters (by arrangement) (STOLTENBERG)

Lec. Lab. MT 1:05-4:

11. Morphogenesis.—Factors influencing animal form and structure are considered. Especial attention is given to man and mammals. Lectures and assigned reading.

2 units, winter quarter (CONGDON)

Lec. MW -

12. Human Embryology.—This course will be offered as soon as adequate provision can be made. Course 12 in the Department of Zoology is a prerequisite.

13. Investigation and Special Work.—The facilities of the laboratory are always at the disposal of properly qualified students or physician.

who desire to undertake the investigation of some problem in gross or microscopic anatomy or in embryology. Theses and special work must be arranged for individually, but may begin at any time.

REQUIREMENTS FOR ADVANCED DEGREES.—In addition to the requirements published in the University Register and the Announcement of the School of Medicine, students desiring to be admitted to candidacy for the degree of Master of Arts in Anatomy must have satisfactorily completed one year's work in histology and microscopic anatomy, at least one quarter of embryology, and possess a knowledge of laboratory technique adequate for the investigation to be undertaken. For admission to candidacy for the degree of Doctor of Philosophy a reading knowledge of both French and German is further required.

DEPOSIT FEES.—A deposit of \$2.50 for microscopes and of \$10 to cover damage to or loss of bones, is required of all students registering in gross and in microscopic anatomy. This sum, less charges for damage or loss, is refunded at the close of the academic year, except in the case of students discontinuing work. Such may obtain the refund at the end of the quarter. Students who are not registered in medicine are charged a fee of \$15 for each of courses 3, 4, and 5, and \$5 for each of the other courses.

Embryology.—Development of the chick through the first three days of incubation. (Course 12 in the Department of Zoology.)

3 units, spring quarter. (PRICE)

APPLIED MATHEMATICS

LEANDER MILLER HOSKINS, Professor.

HALCOTT CADWALADER MORENO, SIDNEY DEAN TOWNLEY, WILLIAM ALBERT MANNING, Associate Professors.

ERNEST WILLIAM PONZER, Assistant Professor.

The courses in Applied Mathematics are planned primarily to meet the needs of students in Engineering. The aim is to make these courses practical in the sense of furnishing thorough drill on fundamental principles and much practice in their application. Emphasis is laid upon accuracy and system in the solution of numerical problems. Students whose training in arithmetical work has been deficient, or who are otherwise inadequately prepared, or who lack aptitude for mathematical study, can not pursue these courses successfully.

Students majoring in any engineering department should have entrance credit in the preparatory subjects of algebra (one and one-half

units), plane and solid geometry, and plane trigonometry. This preparation is required for admission to any of the following courses except Descriptive Astronomy.

The mathematics regularly required of students in engineering consists of courses 1, 2, and 3. Each of these courses runs two quarters, 5 unit-hours per quarter, and they will regularly be taken in the order 1a, 1b, 2a, 2b, 3a, 3b; it is possible, however, to take 2b and 3a simultaneously. Those who, though having entrance credit in the prerequisite subjects, are for any reason lacking in the command of elementary algebra and plane trigonometry (including numerical computation) which is necessary for the satisfactory pursuit of course 1 should begin with course A and plan to enter 1a the following quarter. Such students, if successful, and if able to carry courses 2b and 3a simultaneously, may complete the required mathematics in six quarters.

A. Elementary Analysis.—This course is designed for students who, though having entrance credit in algebra, plane and solid geometry and plane trigonometry, are, because of long disuse of these subjects or for other reason, lacking in the command of them which is requisite to satisfactory progress in course 1. A review of the elementary part of algebra and trigonometry will be supplemented by practice work especially in numerical applications, designed to facilitate the progress of the student in the courses required of students of engineering.

5 units, autumn quarter (PONZER)

MTWThF

1. Elementary Analysis.—This course presupposes a familiarity with the elements of algebra and trigonometry, and is designed to strengthen the command of the student over these subjects and to give him a working knowledge of the method of co-ordinate geometry. Readiness in the application of the fundamental principles of algebra, trigonometry, and geometry to the solution of numerical problems of fundamental importance to the engineer, and this side of the work is emphasized throughout the course.

1a. First half of course 1.

5 units, autumn or winter quarters (PONZER, MANNING, MORENO)
(Autumn) MTWThF 9, 10; (winter) MTWThF 9

1b. Second half of course 1.

5 units, winter or spring quarters (PONZER, MORENO)
(Winter) MTWThF 9, 10; (spring) MTWThF 9

2. Calculus.—An elementary course in Differential and Integral Calculus, in which emphasis is laid on fundamental principles and simple applications.

2a. First half of course 2.

5 units, spring or autumn quarters (MORENO, PONZER, MANNING, TOWNLEY, HOSKINS)

(Spring) MTWThF 9, 10; (autumn) MTWThF 8, 9

2b. Second half of course 2.

5 units, autumn or winter quarters (MANNING, TOWNLEY, HOSKINS)

(Autumn, beginning in 1918); (winter) MTWThF 8, 9

3. Theoretical Mechanics.—An elementary course, covering the fundamental principles of Statics, Kinematics, and Kinetics, restricted mainly to coplanar forces and to plane motion of particles and of rigid bodies. An elementary treatment of Graphic Statics is included. The course is designed as preparation for the courses in Applied Mechanics taken by students of Engineering, but is open to all whose preparation includes the equivalent of courses 1 and 2.

3a. First half of course 3.

5 units, winter quarter (TOWNLEY, MANNING, HOSKINS)

MTWThF 10

3b. Second half of course 3.

5 units, spring quarter (MORENO, MANNING, HOSKINS)

MTWThF 10

4. Theoretical Mechanics.—A more advanced course, presupposing course 3 or its equivalent. (Given if there is sufficient demand.)

5 units, autumn quarter (HOSKINS) Hours to be arranged

8. Engineering Mathematics.—This course is designed to meet the needs of students in Electrical Engineering, and should be taken by those intending to take course 7 in Electrical Engineering.

5 units, autumn quarter (MORENO) MTWThF 8

9. Graduate Courses.—Advanced courses in Theoretical Mechanics, Hydromechanics, Theory of Heat, Theory of the Potential Function, Theory of Elasticity, or other subjects, may be arranged for students having the requisite mathematical training.

[Advanced Electrotechnics.—See announcement of the Department of Electrical Engineering, course 7.

4 units, winter quarter (RYAN, MORENO)]

ASTRONOMY AND GEODESY

The course in Descriptive Astronomy is designed especially to meet the needs of students who have time for only a general knowledge of the subject. Course 11 is designed especially for students of Engineer-

ing and Geology who desire a working knowledge of practical astronomy. The other courses are intended for students of Mathematic Civil Engineering who wish to prepare themselves for geodetic work.

10. Descriptive Astronomy.—This course consists of a general survey of the various branches of astronomy, including a study of the celestial sphere, the bodies of the solar system, comets, the fixed stars and other heavenly bodies. The treatment is non-mathematical.

4 units, autumn quarter (TOWNLEY) MTW.

11. Practical Astronomy.—The theory and practice of the determination of latitude, azimuth, time, and longitude, with sextant and engineer's transit. Intended especially to meet the requirements of students of civil engineering. Course 1, differential calculus, and trigonometry are prerequisites.

4 units, spring quarter (TOWNLEY) MTW.

12. Advanced Practical Astronomy.—A continuation of course 11. Precise methods of determining time, latitude, etc., by means of the universal instrument.

Any quarter (TOWNLEY) Hours and units to be adjusted.

13. Adjustment of Observations.—Theory of the method of least squares, with applications. Credit in course 2 or its equivalent is prerequisite.

3 units, winter quarter (TOWNLEY) MW.

14. Geodesy.—Study of the form and dimensions of the earth and the practical methods of geodetic work. Courses 11 and 13 are prerequisites.

3 units, autumn quarter (TOWNLEY)

BACTERIOLOGY AND EXPERIMENTAL PATHOLOGY

WILFRED HAMILTON MANWARING, Professor.

JOHN TIMON CONNELL, Instructor.

HERBERT LEE NIEBEL, HAROLD ENOS CROWE, Assistants.

NON-MEDICAL COURSES

A. General Bacteriology.—A non-technical course, covering the entire field of Bacteriology and Serology, designed primarily for sanitary chemists, nurses, social workers, and teachers. Not open to medical or pre-medical students. Prerequisites: 120 units of University work.

sity work, including fifteen units of biological science and fifteen units of Chemistry.

7 units, spring or summer quarters (CONNELL, NIEBEL)

Lec. MWThF 8; Lab. MTh 9-11, T 8-11

B. Milk, Water, Food, and Drug Analysis.—Standard hygienic laboratory methods. Prerequisite: Course A. [Not given in 1917-18.]

6 units, autumn quarter (CONNELL, NIEBEL) By arrangement

MEDICAL COURSES

1. Introductory Medical Bacteriology.—Required medical course. Prerequisites: 150 units of University work, including Anatomy 1, Chemistry 17, *f* and *l*, or equivalents.

4 units, spring or summer quarters

(CONNELL, NIEBEL)

Lec. TTh 8; Lab. TTh 9-11

Vacation Class, 3 units, September 17-October 3. MTWThFS 8-4

(NIEBEL, CROWE)

1a. Elective Quiz.

1 unit

S 8

2. Pathogenic Bacteriology.—Required medical course. Prerequisites: Physiology 3, 4, and course 1.

6 units, autumn quarter (MANWARING, CONNELL, NIEBEL, CROWE)

Lec. MWS 9; Lab. M 10-12, T 9-12, Th 9-11

2a. Elective Quiz.

1 unit

By arrangement

2b. Elective Exercises in Immunity.

2 units

F 8-12

3. Elementary Serology.—Elective. Prerequisite: Course 2.

5 units, winter quarter (MANWARING, CROWE)

Lec. S 9; Lab. TTh 8-12

4. General Pathology.—Required medical course. Continuous with course 1 in the Division of Pathology, in San Francisco. The course covers: circulatory disturbances, degenerations, pigmentations, regenerations, and inflammation. Prerequisites: Anatomy 3, 4, 5, Zoology 12, and course 2.

6 units, winter quarter (MANWARING)

Lec. MWF 9; Lab. MWF 10-12

4a. Elective Exercises in Experimental Pathological Technique.

2 units

W 1-4

5. Advanced Work, Research.

FEES.—Courses A, B, 1, 3, 4, \$20 each; course 2, \$25; elective exercises, courses 2, 4, \$5 each; vacation class, course 1, \$10. Students pay for breakage and animals used.

MAJOR REQUIREMENTS: Graduate students, who have completed the full prerequisites for course 2, will be admitted as candidates for the degree of A. M., in Bacteriology and Experimental Pathology. Requirements for graduation: Courses 2, 3, 4, and thesis (12 units).

BIBLICAL HISTORY AND LITERATURE

DAVID CHARLES GARDNER, Chaplain, Lecturer.

AUGUSTUS TABER MURRAY (Department of Greek), HENRY DAVID GRAY (Department of English).

1. Life and Teaching of Christ.—A history of the life and times of Jesus, with a study of the four Gospels, an analysis of the Ethics of Jesus, and the application of his teaching to the life of today. Lectures, discussions, and papers.

1 unit, autumn, winter, and spring quarters (GARDNER) Th 1:05

English Bible.—Representative portions of the Bible studied as literature, with some consideration of the history and the prose style of the English versions. Not open to first-year students. [English 16.]

4 units, autumn quarter (GRAY)

MTWTh 10

New Testament Literature.—A critical introduction to the literature of the New Testament for general students; no knowledge of Greek is presupposed. Lectures with assigned readings. [Greek 20.]

3 units, spring quarter (MURRAY)

MWF 10

BOTANY

DOUGLAS HOUGHTON CAMPBELL, GEORGE JAMES PEIRCE, Professors.

LEROY ABRAMS, LEONAS LANCELOT BURLINGAME, Associate Professors.

JAMES IRA WILSON McMURPHY, Instructor.

The Department of Botany aims to provide instruction for two classes of students: (a) Students who wish to know something of the structures, life processes, and relationships of plants, and to gain some familiarity with the methods of scientific work; and (b) Professional

students who look forward to investigation, teaching, or the technical applications of Botany in Plant Breeding, Forestry, Agriculture, Horticulture, Plant Pathology, etc. Courses 1a, 1b, 1c, which present the elements of the more important divisions of botanical study, are designed to meet the needs of both groups of students and must precede all other courses in the department, except in the case of students who have received equivalent credit. Courses 2 to 16 are open to students who have had courses 1a, 1b, 1c, or their equivalent. It is the aim of these courses to give the student, by means of lectures and references to the literature, a general and summary account of the present state of knowledge, and in the laboratory and the field to afford him an opportunity for a personal acquaintance with plants themselves. Students who have had two or more years' work may, after consultation, be registered in courses 17, 18, 19, 20, 21. The resources of the department afford exceptional opportunity for investigation in a number of fields. Properly qualified students desiring to undertake such investigation should register in courses 22, 23, 24, 25, 26, after consultation with the instructor concerned.

Major students in the department will be expected to complete 60 units in the department, and Zoology 1. The sixty units should include courses 1a, 1b, 1c, 2, 3, 4 or 5, 7 or 8, 9, 10 or 11, and 12 or 13. It is strongly recommended that courses 2, 3, 7, and 8 be taken in the second year.

The TEACHER'S RECOMMENDATION for High School Botany is based on a minimum of courses 1a, 1b, 1c, 2 or 3, 7 or 8, 4 or 5, 10, and 12 or 13.

Students looking to Forestry or Agriculture as a profession should include courses 4, 5, 10, 11, 12, and 13, as part of their preparation, and the following subjects in other departments: elementary physics, chemistry, geology and physiography, zoology, entomology, economics, and applied mathematics. They should also be able to read French and German.

Fees are charged in the various courses approximately sufficient to cover the cost of the perishable materials and syllabus used, as follows: Courses 1, 2, 3, 7, 8, 9, 10, 11, 17, 18, 19, 20, 22, \$3.00 each; courses 4, 5, 6, 12, 13, 14, 16, \$5.00 each.

1a. Elementary Botany: Morphology.—This course is designed to be a foundation course. It aims to present a comprehensive view of the entire plant kingdom from the lowest to the highest. The individual types studied will be chosen with reference to their suitability to illustrate the larger steps through which plants have passed in the

course of evolution. The laboratory work will be supplemented by field work. Campbell's "A University Text Book of Botany" is used as the principal text and should be owned by, or at least be available to, every student. References to other books will be given whenever advisable and such supplementary reference books will be kept on a shelf in the laboratory and will not be permitted to be taken from the room. The hour preceding the lecture on Tuesdays and Thursdays will be spent in the laboratory in study and conference under supervision.

5 units, autumn or summer quarters (CAMPBELL, BURLINGAME, and Assistants)

Conferences TTh 1:05; Lec. TTh 2:05; Lab. MWF 1:05-3:45

1b. Elementary Botany: Systematic.—Study of the fundamental principles of plant relationships, with special reference to the higher plants. The morphology of a pteridophyte, a gymnosperm, and an angiosperm will precede the general structural studies of the principal orders. The laboratory work will be supplemented by field work and classification.

5 units, winter quarter (ABRAMS)

Lec. TTh 2:05; Lab. MWF 1:30—

1c. Elementary Botany, Anatomy, and Physiology.—Study of the structure, mainly of the land plants, with a view to understanding the vital processes of living plants. The laboratory work will be supplemented by field work.

5 units, spring quarter (PEIRCE, —————)

Lec. TTh 2:05; Lab. MWF 1:05-3:45

2. Fresh-Water Algae.—Lectures, reading, and laboratory work on the morphology and classification of Blue-green and Green Algae. Prerequisite: Botany 1a.

5 units, winter quarter (CAMPBELL)

Lec. TTh 1:05; Lab. MWF 1:05-3:45

3. Marine Algae.—Lectures, reading, and laboratory work on the morphology and classification of the Brown and Red Algae. This course is a continuation of course 2, but may be taken independently. Prerequisite: Botany 1a.

5 units, spring quarter (CAMPBELL)

Lec. TTh 1:05; Lab. MWF 1:05-3:45

4. General Fungi.—Lectures and laboratory work on the morphology and classification of Fungi.

5 units, autumn quarter (McMURPHY) Lab. MTWThF 8-10

- 5. Fleishy Fungi.**—Lectures, laboratory, and field work on the fleshy Fungi ordinarily known as mushrooms, toadstools, etc.
5 units, winter quarter (McMURPHY) Lab. MTWThF 8-10
- 6. Plant Pathology.**—Lectures, laboratory, and field work on fungous and other plant diseases. Open only to students who have had course 4 or its equivalent.
5 units, spring quarter (McMURPHY) Lab. MTWThF 10-12
- 7. Bryophytes.**—Lectures and laboratory work on the special morphology and classification of the Bryophytes (Mosses). Prerequisite: Botany 1a. [Not given in 1917-18.]
5 units, winter quarter (CAMPBELL)
Lec. TTh 1:05; Lab. MWF 1:05-3:45
- 8. Pteridophytes.**—Lectures and laboratory work on the special morphology and classification of Pteridophytes (Ferns, Horsetails, Club-mosses). This course is a continuation of course 7. Prerequisites, 1a and 7. [Not given in 1917-18.]
5 units, spring quarter (CAMPBELL)
Lec. TTh 1:05; Lab. MWF 1:05-3:45
- 9. Seed Plants.**—Lectures and laboratory work on the general morphology and anatomy of Gymnosperms and Angiosperms. This course is intended to continue and round out the work of courses 2, 3, 4, 7, 8. It aims to give the student an insight into the origin and relationships of the larger groups of Seed Plants through a study of their Morphology, Embryology, and Comparative Anatomy. Prerequisite: Course 1a; desirable, course 8.
5 units, winter quarter (BURLINGAME)
Lec. and Conf. TTh; Lab. MWF 10-12
- 10. Systematic Botany.**—Study of the flowering plants with special emphasis on the more complex and difficult groups. In connection with the course a botanical survey of the local flora will be undertaken, in which each student will choose a special problem. Course 1b is a prerequisite.
5 units, spring quarter (ABRAMS)
Lec. TTh 2:05; Lab. MWF 1:30-4
- 11. Geographical Distribution and Forest Botany.**—Study of the trees and shrubs and the principles of geographical distribution which they illustrate. The laboratory work will be supplemented by work in the field and in the Arboretum.
5 units, autumn quarter (ABRAMS)
Lec. TTh 1:05; Lab. MWF 1:30-4

12. Nutrition and Respiration.—Experimental study of these two functions, supplemented by lectures and reading. Prerequisite: 1c or its equivalent. Knowledge of the elements of physics and chemistry is desirable.

5 units, autumn quarter (PEIRCE)

Lec. TTh 2:05; Lab. MWF 1:05-3:30

13. Growth, Irritability, and Reproduction.—Experimental study supplemented by lectures and reading. Prerequisite: Course 1c or its equivalent. Knowledge of the elements of physics and chemistry is desirable.

5 units, winter quarter (PEIRCE)

Lec. TTh 2:05; Lab. MWF 1:05-3:30

14. Technique.—Laboratory instruction in the principles and practices of killing, fixing, sectioning, staining, imbedding, etc., ordinarily used in botanical work. Students will be given an opportunity to learn photomicrography when desired. Prerequisite: Botany 1a.

5 units, spring quarter (BURLINGAME) Lab. MTWThF 8-12

15. Plant Breeding.—Lectures, demonstrations, and laboratory work illustrative of the principles and practices underlying modern practice in the propagation and improvement of plants. Prerequisite: Botany 1a, Zoology 1, or equivalent. [Not given in 1917-18.]

5 units, winter quarter (BURLINGAME)

Lec. TTh; Lab. MWF 10-12

16. Cytology.—Lectures and laboratory work on the structure and functions of plant cells. Especial attention is given to the bearing of cytological facts on heredity, plant breeding, and evolution. Prerequisites: Courses 1a and 14. [Not given in 1917-18.]

5 units, spring quarter (BURLINGAME)

Lec. TTh; Lab. MWF 10-12

17. Advanced Plant Pathology.—Field and laboratory work on special diseases.

(McMURPHY) Hours and credits by arrangement

18. Advanced Archegoniates.—This course offers work for individual students to continue the work begun in courses 7 or 8 along lines of special interest. Prerequisites: Elementary Botany and courses 7 or 8 or equivalents.

(CAMPBELL) Hours and credit by arrangement

19. Advanced Systematic Botany.—Special problems in taxonomy and geographical distribution, with reference to methods of investiga-

on. This course is intended primarily as preliminary training for research work in taxonomic botany.

5 units, one or more quarters (ABRAMS) Lab. MTWThF 1:30-4

O. Problems in Genetics and Plant Breeding.—This course offers an opportunity to continue advanced work along the lines of course 15.

Any quarter (BURLINGAME)

By arrangement

1. Advanced Physiology.—Experimental study of a single problem by one or more individuals. Prerequisites: Elementary Botany and courses 12 and 13, or their equivalents.

(PIERCE) By arrangement

2. Research in Morphology.—Students desiring to do original investigation in morphology must have had adequate training in the appropriate special morphology courses or their equivalents.

(CAMPBELL) By arrangement

3. Research in Plant Pathology.

(McMURPHY) By arrangement

4. Research in Taxonomy and Geographical Distribution.

(ABRAMS) By arrangement

5. Research in Cytology and Genetics.—For students who wish to undertake original work in genetics or cytology. Prerequisites are an adequate training in general botany and such special courses as the nature of the work makes necessary.

Any quarter (BURLINGAME)

By arrangement

6. Research in Physiology.

(PIERCE) By arrangement

CHEMISTRY

HEN MAXSON STILLMAN, Professor Emeritus.

ROBERT ECKLES SWAIN, LIONEL REMOND LENOX, EDWARD CURTIS

FRANKLIN, STEWART WOODFORD YOUNG, Professors.

HEN PEARCE MITCHELL, Associate Professor.

WILLIAM HENRY SLOAN, Assistant Professor.

JOICE RUTH BERGER, WILLIAM EDMUND BURKE, TENNEY LOMBARD

DAVIS, NATHANIEL HOWELL FURMAN, NORRIS FOLGER HALL,
Instructors.

GEORGE WENDELL ELSEY, NORRIS WATSON RAKESTRAW, Teaching
Fellows.

I. LECTURE COURSES

1. General Inorganic Chemistry.—Comprising a systematic treatment of elementary principles and of the properties of the more important elements and their compounds. Open to all students. Those not having entrance credit in Chemistry will be required to enroll in Chemistry 2, and in laboratory course *a* concurrently.

3 units, autumn or winter quarters

(Autumn, MITCHELL) MWF 8; (winter, HALL) TTh 8

2. General Inorganic Chemistry.—Recitation section supplementary to courses 1 and *a*. Required of students without entrance credit in Chemistry.

1 unit, autumn or winter quarters (——) T 11

3. General Inorganic Chemistry.—Continuation of Chemistry 1. Open to students who have had courses 1, 2, and *a*, or their equivalent. (Entrance credit in Chemistry is equivalent to courses 2 and *a*.)

3 units, winter or spring quarters

(Winter, MITCHELL) MWF 8; (spring, HALL) TThS

4. General Inorganic Chemistry.—Combination of Chemistry 2, and 3. Open to all students in the summer quarter.

6 units, summer quarter (HALL) MTWThFS

5. Principles of Inorganic Chemistry.—Discussion of the elements of chemical theories and of important generalizations in the field of inorganic chemistry. Prerequisite: Chemistry 3 or 4, or their equivalent. [To be given in summer quarter of 1918.]

4 units, autumn quarter, and summer quarter in alternate years.

(SWAIN) MTWF 1

6. Principles of Inorganic Chemistry.—Continuation of Chemistry 5. Prerequisite: Chemistry 5 or its equivalent. [Not to be given in summer quarter of 1918.]

4 units, spring quarter, and summer quarter in alternate years.

(SWAIN) MTWF

7. Organic Chemistry.—Lectures and reviews on the chemistry of carbon compounds. Open to students who have completed courses 5 and 6 or their equivalent.

5 units, autumn quarter (FRANKLIN) MTWThF

8. Organic Chemistry.—Continuation of Chemistry 7.

5 units, winter quarter (FRANKLIN) MTWThF

9. Advanced Organic.—Advanced topics in organic chemistry, including stereochemistry. Open to students who have completed courses 5-6, and 7-8. [To be given in 1918.]

3 units, spring quarter in alternate years (FRANKLIN) MWF 8

10. Elementary Organic Chemistry.—A condensed course in organic chemistry is offered particularly for students in medicine, but open to all who have completed course *d*. (See Department of Medicine, Division of Chemistry, course 1.) Brief course, not for Chemistry majors.

5 units, spring or summer quarters (DAVIS)

(Spring) MTWThF 8; (summer) MTWThF 10

11. Chemical Calculations.—Consists of a series of problems designed to review the fundamental principles of analytical and theoretical chemistry. Open to juniors and seniors who have had courses 5, 6, and *f*. A series of more advanced problems will be given by arrangement.

3 units, spring quarter (MITCHELL) MWF 8

12. Industrial Chemistry.—Lectures on fuels, water, acid and alkali manufacturing, explosives, sugar-making and refining, petroleum. Open to students who have completed courses 5-6, and 7-8, or may be taken concurrently with 7-8.

5 units, spring quarter (LENOX, FRANKLIN, SWAIN, MITCHELL)

MTWThF 9

13. General Physical Chemistry.—Lectures covering as far as possible the whole field of physical chemistry. Open to students who have completed Chemistry 5, 6, 7, 8, and *f*, courses 7 or 5 in Mathematics, and courses 6, or 7, or 1 and 2 (if possible 1, 2, and 3) in Physics.

5 units, autumn quarter (YOUNG) MTWThF 8

14. General Physical Chemistry.—Continuation of Chemistry 13.

5 units, winter quarter (YOUNG) MTWThF 8

15. The Concepts and Laws of Chemistry.—The aim of this course is to impart a critical attitude toward the concepts and laws of chemistry, and to give thereby a greater depth and flexibility of thought concerning fundamental principles to those intending to teach the science.

2 or 3 units, summer quarter only (YOUNG)

Hours by arrangement

16. Electro-Chemistry.—Discussion of the general theories and applications of electro-chemistry. Open to seniors in Chemistry, and to others who have completed courses 13 and 14 or their equivalent.

3 units, spring quarter (BURKE) MWF 11

17. Physiological Chemistry.—Lectures on the chemical composition and action of the tissues and secretions of the animal body, the digestion of foods, and the elimination of waste products. Open to students who have completed courses 7 and 8, or 10.

5 units, autumn or summer quarters (SWAIN) MTWThF 8

18. Seminary in Chemistry.—Discussion of assigned topics in theoretical and general chemistry. Open to graduate students, and to advanced undergraduates in Chemistry, with the approval of the Faculty in Chemistry.

1 unit, every quarter (FRANKLIN, YOUNG, SWAIN)

Time to be arranged

II. LABORATORY COURSES

a. Elementary Inorganic Chemistry.—In connection with courses 1 and 2. Illustrating fundamental laws and principles of elementary chemistry. Required of students who have not received entrance credit in Chemistry.

3 units, autumn or winter quarters (MITCHELL, HALL, ELSEY, RAKESTRAW) MTW 1-4 or ThF 1-4 and S a. m.

b. General Inorganic Chemistry.—Inorganic preparations and general chemistry. For students with entrance credit or Chemistry a.

3 units, every quarter (MITCHELL, HALL, ELSEY, RAKESTRAW) MTW 1-4, or ThF 1-4 and S a. m.

c. General Inorganic Chemistry.—Combination of a and b. Open to all students in the summer quarter.

5 units, summer quarter (HALL) 5 afternoons

d. Qualitative Analysis.—Open to students who have completed courses 3 or 4, and b or c.

5 units, autumn, winter, or spring quarters (LENOX, BERGER); summer quarter (SLOAN) 5 afternoon

e. Organic Preparations.—Preparation of typical carbon compounds. Open in connection with courses 7 and 8 to students who have completed course d.

5 units, winter, spring, or summer quarters (FRANKLIN, DAVIS) 5 afternoon

f. Quantitative Analysis.—Introductory. Training in manipulation in gravimetric and volumetric methods. Open to students who have completed course d.

5 units, autumn or winter or summer quarters (Autumn, winter, SLOAN; spring, FURMAN; summer, SLOAN) 5 afternoon

h. Quantitative Analysis.—A continuation of course *f*, principally gravimetric methods.

5 units, autumn or winter or summer quarters (SLOAN, FURMAN)
5 afternoons

i. Advanced Quantitative Analysis.—Systematic mineral analysis and volumetric assays of ores of copper, lead, zinc, iron, and manganese. Considerable option is allowed in this course to meet the needs of students interested in special lines of work or in particular industries. Open to students who have completed courses *f* and *h* and required of all students registering in division B (Analytical Chemistry).

Students majoring in other departments, who have completed course *f* in Chemistry, may register for three units work in this course, covering the volumetric portion only.

3 or 5 units, autumn or spring quarters (LENOX, BERGER)
5 afternoons

k. Physical-Chemistry Measurements.—Exercises in the practice of physical-chemical laboratory methods. Open to students who have completed or are taking courses 13-14, and who have completed courses 7, 8, *e*, and *f*. In special cases and by special arrangement this course will be open to students who have completed courses 7, 8, *e*, and *f*, but have omitted courses 13-14.

5 units, every quarter (YOUNG, BURKE) 5 afternoons

l. Physiological Chemistry.—A laboratory course including a preliminary study of the proteins, carbohydrates, and fats, and the action of the various digestive fluids upon them; followed by a chemical examination of the bile, blood, milk, the chief tissues of the animal body, and the excretions. The latter half of the course is devoted to quantitative analytical methods. In connection with course 17.

5 units, autumn or summer quarters (SWAIN) 5 afternoons

x. Advanced and Special Courses.—Advanced and Special Courses in laboratory work and research work are open to students who have completed the necessary prerequisites, by arrangement with professors of the Department, and with reference to the particular aims and ambitions of the students. Such advanced or special subjects are, for example: special methods in mineral analysis, iron and steel analysis; special methods in assaying; water analysis; urine analysis; elementary organic analysis; special organic preparations; analysis of sugar, toxicology, etc.

Qualified students may also pursue investigations of problems in inorganic, organic, physical, analytical, or physiological chemistry under the direction of any professor with whom arrangement is made.

For all such advanced, special, or research work, students will register and enroll under x , giving name of the professor under whom the work is to be carried on, and for such number of units of credits as may be agreed upon.

Students intending to major in the Department of Chemistry are advised to offer entrance credits in chemistry, physics, mathematics (including solid geometry and trigonometry for the chemical engineering course), and German (2 units). Students without these entrance credits may experience some difficulty, especially in the chemical engineering course, in conforming to the Departmental requirements for graduation.

Candidates for the degree of Bachelor of Arts in Chemistry may select any one of the four following curricula (A, B, C, D), the requirement of the Department being as follows:

A. GENERAL CHEMISTRY

FIRST YEAR—Chemistry 1, 3, b, d , (2, a); German 1, 2, 3; Mathematics 7 or 5.

SECOND YEAR—Chemistry 5, 6, f ; German 25, 26, 27; Physics 7.

THIRD AND FOURTH YEARS—Chemistry 7, 8, 13, 14, e, k or x .

Recommended for all who are studying the science of chemistry for its own sake or for the profession of teaching.

B. ANALYTICAL CHEMISTRY

FIRST YEAR—Chemistry 1, 3, b, d , (2, a); German 1, 2, 3.

SECOND YEAR—Chemistry 5, 6, f ; German 25, 26, 27; Physics 7; Geography 1; Geology 1.

THIRD AND FOURTH YEARS—Chemistry 7, 8, e, h, i, k , or x ; Mineralogy 1; Metallurgy 1.

Particularly adapted to students who are looking forward to the career of analytical chemist and assayer.

C. MEDICAL AND SANITARY CHEMISTRY

FIRST YEAR—Chemistry 1, 3, b, d , (2, a); German 1, 2, 3.

SECOND YEAR—Chemistry 5, 6, f ; German 25, 26, 27; Physics 7.

THIRD AND FOURTH YEARS—Chemistry 7, 8, 17, e, l, k or x ; Physiology 1, 2; Bacteriology A or 1.

Particularly adapted to students who are looking forward to medical education or to sanitary chemistry.

D. CHEMICAL ENGINEERING

This curriculum comprises four years of the necessary five years' work leading to the advanced degree of Engineer in Chemical Engineering. Candidates in this course receive the degree of A. B. in Chemistry upon completion of the following requirements:

FIRST YEAR—Chemistry 1, 3, *b*, *d*, (2, *a*); German 1, 2, 3; Applied Mathematics 1*a*, 1*b*, 2*a*; Engineering 1, 2.

SECOND YEAR—Chemistry 5, 6, *f*; German 25, 26, 27; Applied Mathematics 2*b*, 3*a*, 3*b*; Engineering 3, 4; Mechanical Engineering 12.

THIRD YEAR—Chemistry 7, 8, *h*; Engineering 10, 11, 12; Physics 6; Mechanical Engineering 13.

FOURTH YEAR—Chemistry 12, 13, 14, *e*; Physics 6; Mechanical Engineering 32, 33.

Intended particularly for students who are working toward the degree of Chemical Engineer and who desire to fit themselves for positions of responsibility in connection with the administration of industries involving chemical knowledge and skill.

ADVANCED DEGREES

Applicants for the degree of Master of Arts in Chemistry will be expected to complete in addition to the requirements for the bachelor's degree, the equivalent of forty-five units work in the University—of which approximately two-thirds must be in the Department. This work will include a thesis based on laboratory work, and Chemistry 13, 14, and *k*, if not included in the undergraduate work.

Candidates for the advanced degree of Engineer in Chemical Engineering will be required to complete, in addition to the requirements for the A. B. degree specified under course D: Chemistry *k* or *x*; Mechanical Engineering 14, 21, 23, 36, and a thesis based on laboratory work. Electrical Engineering is advised, if possible, though not required. It is estimated that these requirements may be completed in one year after the completion of the requirements under Course D.

Candidates for the degree of Doctor of Philosophy in Chemistry, after the completion of the equivalent of the requirements for Master of Arts or Engineer, will follow such courses as are approved by the Department faculty, subject to general University regulations.

THE TEACHER'S RECOMMENDATION.—The minimum requirements for the high school teacher's recommendation in Chemistry are courses 1, 3, *b* (General Inorganic, lectures and laboratory); *d* (Qualitative Analysis); 5, 6 (Principles of Chemistry); and either 7 or 10 (Organic Chemistry).

LABORATORY FEES.—A charge of \$25 per quarter will be made to students in each laboratory course of not more than six units registration. Of this charge \$10 per quarter is returnable, less bill for breakage and loss of apparatus. A charge of \$15 will be made for 3 units credit in Chemistry; or \$5 returnable, less breakage.

ECONOMICS

AND POLITICAL SCIENCE

MURRAY SHIPLEY WILDMAN, ALBERT CONSER WHITAKER, ALVA N
SAUNDERS JOHNSON, Professors.

STEPHAN IVAN MILLER JR., VICTOR J. WEST, FREDERIC BENJAMIN N
GARVER, JOHN BENNETT CANNING, Assistant Professors.

WILFRED ELDRED, MARGARET MULFORD LOTHROP, Instructors.

YAMATO ICHIHASHI, GEORGE ARCHIBALD CLARK, Lecturers.

GRADUATION.—To arrange a course of study leading to the degree of Bachelor of Arts a student should consult freely with his departmental adviser in order that his programme of work may be adapted to his special needs or interest. In making such a programme at least a fourth of the required 180 units should be selected from courses offered in this department and at least a third of these should be advanced.

In addition to courses offered in this department others offered in History, Law, Philosophy, English, Sciences, and the languages will be found helpful and under normal conditions should be taken.

Course 1 is prerequisite to every other course in Economics and Course 2 is prerequisite to all others in Political Science. Both of these courses (or their equivalent) are required of all candidates for graduation in this department.

TEACHER'S RECOMMENDATION.—To obtain a teacher's recommendation in Economics or Political Science or both a student must have completed courses 1 and 2 or their equivalent, together with 15 units additional in this department.

JOURNALISM.—Students, majors in this department, who desire to prepare for journalism are referred to page 71.

ELEMENTARY AND GENERAL COURSES

1. Elements of Economics.—General and introductory course, primarily for first year and second year students. Three lectures and two quiz hours each week. Seniors and Juniors may register for it.

course but will be given but three units of credit and their attendance in quiz sections is not compulsory.

5 units, autumn or winter or spring or summer quarters

(WILDMAN, MILLER, GARVER, LOTHROP) MTWThF 9

2. Elements of Political Science.—An introductory study of the origin and nature of the state, forms of government, theories of state functions, citizenship, and political parties. A general course open to all students. This course, or its equivalent, is prerequisite for all other political science courses, and is required for majors.

5 units, autumn or summer quarters (WEST) TWThFS 8

3. Elementary Accounting.—Development of accounting; theory of debit and credit; bookkeeping forms and practice; preparation of balance sheets and their interpretation; application of theory and principle to simple systems of accounts; practical accounting problems. Should be taken by students expecting to enter courses 20 and 55.

5 units, autumn or spring or summer quarters (CANNING)

TWThFS 10

5. Transportation.—This course will cover the main problems of railways in the light of economic principles, and their wider significance to industry and society; the present American railway system and its development, and methods of public control.

5 units, autumn quarter (MILLER)

MTWThF 8

6. Introduction to Statistics.—A study of elementary statistical methods, based upon data drawn from the phenomena of population, industry, commerce, and finance. Among the formal aspects of the subject attention will be given to the collection and tabulation of data, the construction and use of diagrams, the different kinds of averages and their uses, dispersion, correlation, index numbers, graphical methods. An attempt will be made to illustrate the application of statistical methods to business problems as well as to those of economics in the broader sense. (Three lecture periods and two hours of laboratory work each week, at hours to be arranged.)

5 units, spring quarter (ELDRED)

TThS 8

7. Financial History of the United States.—A general historical survey of the financial policy of the national government with especial emphasis on the Revolutionary and Civil Wars, and recent periods. The subject matter of the course includes the tariff, the internal revenue system, the public land policy, the growth of public expenditures, management of the public debt, and treasury administration. Open to all students who have had or are taking Economics 1.

4 units, winter quarter (GARVER)

MTWF 11

8. Economic Resources of the United States.—A lecture and reading course on the economic resources of the United States, with some attention to the problems of conservation and public control. This course should be taken as prerequisite to 25b, Marketing of Farm Products, and 67, Industrial Development of the United States.

5 units, winter or summer quarters (ELDRED) MTWThF 9

9. State and Local Government.—Township, county, and state government in the United States, with special attention to California. Prerequisite: course 2.

5 units, winter quarter (WEST) TWThFS 8

10. Bond Values and Capitalization.—A problem course in the application of the rate of interest to the valuation of income-bearing property; future sum and present worth; the rate of discount and rate of interest; simple and compound interest; the present worth of commercial paper; the capitalized value of annuities; the valuation of bonds and shares on the basis of a given rate of interest; the construction and use of bond value tables; accrued interest; the nature of depreciation; depreciation funds in theory and practice; sinking funds; the principles of capitalized value applied to mines, forests, industrial plants, franchises, inventions, etc. The student's work will consist largely in the solution of assigned problems. No advanced mathematics required, and majors of other departments will be admitted without prerequisites. This course is a prerequisite to 20, Corporation Finance, and 60, Valuation.

4 units, autumn quarter (WHITAKER) MTWTh 10

12. Financing of Enterprises.—Considers incorporation, issue and marketing of securities, the management of debt, and the financing of undertakings generally. Open only to engineering majors.

4 units, winter quarter (WHITAKER) MTWTh 12

15. Problems of State Government.—Some of the more pressing present day difficulties in state government examined critically and constructively. Intended especially for teachers of Civics. Carries no credit for those who have credit for course 9.

3 units, summer quarter (WEST) TThS 15

INTERMEDIATE COURSES

[The following courses are primarily for students who have more than forty units of university credit.]

20. Corporation Finance.—Elementary survey of corporation law—the organization and management of corporations; the corporation's securities, stocks and bonds and their classification; the stock market and stock speculation; capitalization, surplus, reserve, and financial

olicy; the provision of new capital; promotion, underwriting, receiverships and reorganization. Prerequisite, course 10.

4 units, winter quarter (WHITAKER) MTWTh 9

11. Public Finance.—A general course dealing with the principles involved in the conduct of government finances. The major part of the course is occupied with the subject of taxation, including the national, state, and local systems, but the subjects of public debts, public expenditures, the budget, and financial administration are also discussed.

4 units, autumn quarter (GARVER) MTWTh 10

12. Labor Problems.—A general course. The topics considered include the following: the rise of the wage earning class; the industrial revolution; unemployment; woman and child labor; industrial remuneration; collective bargaining.

5 units, summer quarter (GARVER) MTWThF 8

23a. Social Agencies.—A general survey of the problems of poverty and of the modern methods of relief and prevention.

4 units, autumn quarter (LOTHROP) TWThF 10

23b. Social Agencies.—A continuation of course 23a, but open to those who have not had that course.

4 units, winter quarter (LOTHROP) MTWTh 9

23c. Social Agencies.—A general survey of the problems of corrections: the criminal and his characteristics, the treatment of the criminal, the causes and prevention of crime.

4 units, spring quarter (LOTHROP) MTWTh 10

24. Economics and the Home.—The problems of the household as a factor in the consumption of wealth.

3 units, winter quarter (LOTHROP) MWF 11

25a. Marketing of Manufactured Products.—An analysis of the commercial mechanism which has been developed in the United States for the distribution of commodities from manufacturer to consumer, including the organization and inter-relation of the principal types of marketing agencies. Not open to first year students.

3 units, winter quarter (ELDRED) MWF 11

25b. Marketing of Farm Products and Raw Materials.—A study of the forces determining the movement of commodities from producing areas to consuming centers, and of the commercial organization for assembling the raw materials of industry; cooperative marketing systems, notably the association of producers as developed in California; and a survey of available markets for American farm products. Prerequisite: course 8.

3 units, spring quarter (ELDRED) TThS 9

26. Money and Credit.—The elements of monetary theory; the laws of coinage, legal tender, and credit; the standard of value, price movements and their relation to prosperity.

3 units, autumn quarter (WILDMAN) TThS

27. Insurance.—General principles of insurance; their development and application to modern business; organization, forms, and technique of life insurance, industrial insurance; problems of state control.

4 units, spring quarter (CANNING) TWThF

28. Foreign Exchanges.—A study of the system of settling international indebtedness; principles and practice of exchange banking money markets of the world and their relations. Domestic exchange will also be considered. Prerequisite: course 26.

4 units, summer quarter (WHITAKER) MTWTh

29. Intermediate Accounting.—A continuation of the subject with emphasis on more specialized systems of accounts and more complicated problems. Prerequisite: course 3 or its equivalent.

3 units, autumn quarter (CANNING) MWF

30. Water Transportation.—A study of the development and the significance of American and European internal waterways; ocean transportation; the Panama Canal and the relation of water transportation to railways.

4 units, winter quarter (MILLER) MTWTh

34. Comparative Federal Government.—An inquiry into the operation of the federal principle in the United States, Germany, Switzerland, and Argentine. Prerequisite: course 2.

3 units, spring quarter (WEST) MWF

35. Parliamentary Government.—A study of those European governments of which the responsible ministry is the characteristic feature; especial attention to England and France.

4 units, summer quarter (JOHNSON) MTWTh

36. Municipal Government.—Analytic and comparative study of city government in Europe and the United States; relation of city to the central government; organization of city government; special problems of administration.

4 units, spring quarter (WEST) MTWTh

38. American Methods of Taxation.—An examination of some of the more important taxes levied by the national, state and local governments. A detailed and practical study will be made of income, corporation, railroad, bank, insurance, and land taxes. The organization and methods of the leading state tax commissions will also be considered.

4 units, summer quarter (GARVER) MTWTh

ADVANCED AND GRADUATE COURSES

[The courses which follow are not open to any students with less than 80 units of university credit.]

50. Railway Rates and Regulation.—A study of rates in theory and practice; problems of freight classification and routing; distance and commodity tariffs; personal and local discriminations; the growth of state and federal regulation and a survey of important commission and court decisions. To be preceded by course 5. .

4 units, spring quarter (MILLER)

MTWTh 10

51a. Secretarial Training.—Offering in the fall quarter the fundamental training of a stenographer. Open only to junior and senior students of the department who expect to enter upon a business career, and to majors in Education. One hour of instruction and two hours of practice, four times weekly.

4 units, autumn quarter (CLARK)

MTWF 11

51b. Secretarial Training.—A continuation course offering practice work in connection with the common range of secretarial problems, in so far as possible carried out under actual office conditions. Open to students who have had 51a or its equivalent.

4 units, winter quarter (CLARK)

MTWF 11

52. Banking.—The organization of American credit institutions under the Federal Reserve Act, and a comparison between American and European practice.

3 units, spring quarter (WILDMAN)

TThS 9

53. Population.—The purpose of this course is threefold: (1) A historical survey of the phenomena of population in the leading countries, (2) an examination of theories of population, and (3) an attempt to determine the position of population as an economic factor. Students intending to take course 54 are advised to take this course as preparatory to it.

3 units, winter quarter (ICHIHASHI)

MTW 10

54. Immigration and the Race Problem.—A study of immigration as a phenomenon of population, and the social and economic significance of the ethnic composition as affected by it, with special reference to the United States.

3 units, spring quarter (ICHIHASHI)

MTW 10

55. Advanced Accounting.—[Not given in 1917-18.]

57. Government in Its Relation to Industry.—A study of political problems as affected by the changes in business organization since the industrial revolution. The "laissez faire" versus the "general welfare"

concept of government. Measures needed to make the general welfare concept effective.

4 units, spring quarter (JOHNSON)

MTWTF 11

58. Investments.—A study of the issues of national, state, and municipal governments, of railway, industrial, and irrigation companies from the investor's point of view, and the organization and methods of bond and brokerage houses.

3 units, summer quarter (WILDMAN)

TTh S 9

59. Combinations and Trusts.—The forms and methods of industrial pools and combinations or "trusts," and the problem of public control. The course deals with the Federal Anti-trust Legislation and its construction by the courts. Prerequisite, course 20.

4 units, summer quarter (WHITAKER)

MTWTh 10

60. Valuation.—The valuation of the properties of public service companies for the purposes of the regulation of rates, with an introductory study of relevant parts of the theory of value and of interest. Prerequisite: courses 10 and 20.

4 units, autumn quarter (WHITAKER)

MTWTh 10

61. Value and Distribution.—A study of the factors which determine the values of economic goods, and of those which determine the "shares in the distribution of wealth." Prerequisite: 12 units of economics and senior standing, or the permission of the instructor.

4 units, autumn quarter (GARVER)

MTWTh 8

64. Political Parties.—Development of nominating machinery and political issues in the United States; party organization; party activities; reform movements; the true functions of parties.

3 units, autumn quarter (WEST)

TThS 10

65. American Politics.—An examination of the American system with reference to the extent and effectiveness of popular control, special attention being given to the problems connected with elections and legislation.

4 units, winter quarter (JOHNSON)

MTWTh 9

66a. Current Political Problems.—A course designed for well prepared students who desire to make individual studies of present problems in domestic and foreign politics.

4 units, winter quarter (JOHNSON)

MTWTh 9

66b. Current Political Problems.—A continuation of course 66a but open to students who have not had that course.

4 units, spring quarter (JOHNSON)

MTWTh 9

66c. Current Political Problems.—A continuation course, but open to students who have not had 66b.

4 units, summer quarter (JOHNSON)

MTWTh 9

67. Industrial Development of the United States.—A lecture course outlining the economic development of the United States since the period of the Industrial Revolution. Attention will be given to foreign commerce and internal trade; agriculture, mining, and the growth of the West; irrigation and conservation; manufactures and the evolution of selected industries; from the point of view of technical advance and of industrial and commercial organization; the concentration of industry and labor problems; business cycles and industrial crises; the expansion of American foreign trade. To be preceded by course 8, or by a survey course in American history.

3 units, summer quarter (ELDRED)

MWF 11

68. Seminar in Government.—Topic for 1917-18: Procedure in legislative assemblies in the United States.

Winter quarter (WEST)

By arrangement

69. Seminar in Railroad Administration.—This seminar is designed for advanced students expecting to enter railway work as a vocation.

Spring quarter (MILLER)

By arrangement

70. Graduate Seminar.—Open only to candidates for higher degrees and members of the department.

Autumn, winter, and spring quarters

(WILDMAN, JOHNSON) By arrangement

E D U C A T I O N

SCHOOL OF EDUCATION

A School of Education was established in April, 1917. The purpose in its creation is to enable the university to meet, in a thoroughly satisfactory manner, the legitimate demands of the State in the matter of the preparation, training, and certification of teachers and school officers. The Faculty of the School is to be composed of the faculty of the Department of Education, together with representatives from other departments concerned with the preparation of teachers for the intermediate and secondary schools, and the faculty of the School will outline courses for preparation in both majors and minors which will lead to certification as teachers. A special circular will be issued later on, giving more detailed information relating to the work of the School.

Of this School, the faculty of the Department of Education proper will constitute one division, and the faculty of the division of Graphic

following divisions of the subject: (1) History of Education, (2) Elementary or Secondary Education, (3) Administration of Education, (4) Educational Psychology and Theory, (5) Educational Hygiene. Students intending to proceed to the doctorate, either at once or later, should select one of these divisions as a major and one as a minor; complete in large part the required work in a second minor outside of the Department; pass off the modern language requirement and get well started on the dissertation.

LIBRARY AND PRACTICAL FACILITIES

The general university library contains the important recent books and files of the more important educational magazines, both American and foreign. The collection of early American educational magazines and reports is also good. The special library of the Department, consisting of about 7500 volumes, contains one of the most complete collections of American state and city school reports to be found in the United States, the library ranking probably third in this respect. It is also rich in old college and normal school catalogues and text-books of much historical value. The collection of old and present-day school text-books is also large and valuable.

In practical facilities the department has good working connections with the State Normal School at San Jose, and with the public schools of the immediate vicinity. For more important studies by advanced students the large school systems in the vicinity of the University may be used.

The department is also provided with a research laboratory in use in connection with the Buckel Foundation. This is well equipped with the apparatus, blanks, and other materials used in mental and physical tests.

I. ELEMENTARY AND INTRODUCTORY COURSES

[Open to any one with teaching experience, and to all others except first-year students.]

1. Public Education in America.—A study of the development of the public school in each province, and some of the more important problems of public education in the United States. An introductory course. Lectures, followed by a syllabus, with assigned readings.

3 units, autumn quarter (CUBBERLEY)

MWF

2. Educational Theory.—An introductory course dealing with the principles fundamental to education, such as biological infancy, human development and culture, education and the social order, individual

27. Methods and Management of Instruction.—A practical course in the methods and management of secondary instruction. The psychology of the high school subjects will be considered and opportunity for directed observation of expert secondary instruction will be given. This course is intended to be a preparation for practice teaching, and should be taken before course 28.

2 units, autumn or spring quarters (PROCTOR) TTh 8

28. Practice Teaching.—Practice in the handling of classes and the giving of instruction, with accompanying conferences, six units of credit in such being required by the rules of the State Board of Education for a California High School Teacher's Recommendation. This may be arranged for at the University, at the San Jose Normal, or at any other California State Normal School. For opportunities to do practice teaching, arrangement of hours, etc., prospective cadet teachers must confer, in advance: (a) if at the University, with Mr. PROCTOR; (b) if at the San Jose State Normal School, with President DAILEY. Conference with all practice teachers required each week.

3 units, autumn or winter or spring quarters (PROCTOR, DAILEY)
Conference, M 4:05-5

IV. ADVANCED AND SPECIAL COURSES

[Intended primarily for teachers of some experience, and for students making Education a major or a minor. Open to such, of junior standing or above.]

30. Educational Problems.—A discussion club. Open on invitation.

1 unit, each quarter (CUBBERLEY, SEARS, Terman) W 7:45-9:45

31. Education and Modern Social Problems.—A survey of the demands made upon public education by students of modern social problems, and a consideration of possible means of satisfying them. Arranged primarily for prospective supervisors and administrators of schools and school systems. Open to others by permission.

2½ units, 2d half of summer quarter. (DAVIDSON) MTWThF 10

33a. Educational Psychology.—Original endowment; mental development; individual differences in relation to heredity, sex, and environment. Prerequisites: General Psychology.

4 units, winter quarter (TERMAN) MWF 11

33b. Educational Psychology.—The psychology of learning; formal discipline; work and fatigue. Prerequisites: General and Experimental Psychology, or their equivalents.

4 units, winter quarter (TERMAN) MWF 11

35. Educational Statistics.—This course will deal with the theoretical and practical aspects of statistical methods as applied to education, including scales, units and standards. The use of calculating instruments, calculating handbooks, and graphic methods will be demonstrated, and practice will be given in treatment of statistical data. In so far as possible the program will be adjusted to meet the needs of individual students specializing in mental measurement, experimental pedagogy, or educational administration.

3 units, autumn quarter (KORS) MWF 9

2½ units, first half of summer quarter (——) MTWThF 8

37. Mental Deficiency.—The physical and mental traits of the feeble-minded; heredity; medical types; psychological diagnosis; the conduct of special classes, etc. The course will involve visitation of institutions for defectives, observation of special classes, and demonstration tests. A part of the work will necessarily be done away from the University.

2½ units, 2d half of summer quarter (——) MTWThF 8

38. Individual Differences.—A review of the experimental data bearing on the influence of age, sex, heredity, and environment in the production of individual differences found among school children. The work will be based chiefly on the results of mental tests. The use of intelligence scales in the classification and grading of school children will be shown by means of demonstration tests.

2 units, 1st half of summer quarter (TERMAN) MWF 11

39. History of Education in Europe.—A study of the development of educational ideals and systems through the Greek, Roman, Mediaeval, and modern periods in Europe, with the main emphasis upon the post-renaissance period and the transition of influences to America. A study of both texts and sources. Designed especially for those expected to teach the history of education in normal schools and colleges.

4 units, winter quarter (SEARS) MWF 9

40. State School Administration.—A study of the educational principles underlying the proper administration of school systems in states and counties, and involving a comparative study of the school laws and school systems of the various American states. The course includes a study of such topics as federal and state policy, forms of control, revenue and its apportionment, the state and the teacher, the state and the child, private and sectarian education, and state oversight and control.

5 units, autumn and summer quarters (CUBBERLEY) MTWThF 10

- 41. The California School System.**—A critical study of the California state system of education. The California School Code will be carefully examined in comparison with the "School Code of Osceola" and other important state school codes.
2 units, spring quarter (SEARS) F 2-4
- 42a. Rural Education.**—A study of the social and economic factors involved in the development of rural institutional life; how these explain the present status of the larger administrative and supervisory problems of rural education; and the principles and practical methods essential to the solution of these problems.
3 units, spring quarter (SEARS) TTh 2-4
- 42b. Problems in Rural Education.**—A course similar to 42a, but dealing more particularly with problems affecting the organization, administration, and supervision of rural schools.
3 units, summer quarter (SEARS) TTh 2-4
- 43. Foreign School Systems.**—A comparative study of the more important foreign state school systems, their policy of organization, ideals of work, methods of instruction, training of teachers, courses of study, statistics, and recent reforms.
3 units (CUBBERLEY) [Not given in 1917-18.]
- 45. City School Administration.**—A study of the educational, financial, and administrative principles underlying the proper administration of school systems in cities, with a view to the establishment of principles of action. A thesis on some problem in city school organization or administration or a survey of some city school system required of each student.
5 units, spring quarter (CUBBERLEY) MTWThF 10
- 46. The Principal and His School.**—A practical course, dealing with the organization and administration of a single school, the organization and supervision of instruction, school extension, community relationships, etc. Thesis on some administrative problem required of each student.
3 units, spring quarter (CUBBERLEY) TTh 11
- 47. Administration of a City School System.**—A practical course, dealing with the organization and administration of a group of schools under a city board of education, and dealing with such topics as educational and business organization, the organization of instruction, buildings, finance, and plans for development.
3 units, summer quarter (CUBBERLEY) M 2-4

Arts another division, and students in each will in the future receive their degrees from the School of Education.

DEPARTMENT OF EDUCATION

ELLWOOD PATTERSON CUBBERLEY, LEWIS MADISON Terman, Professors.

PERCY ERWIN DAVIDSON, JESSE BRUNDAGE SEARS, Associate Professors.

MORRIS ELMER DAILEY, GEORGE ARCHIBALD CLARK, Lecturers.

WILLIAM MARTIN PROCTOR, Instructor.

SAMUEL C. KOHS, Research Fellow on the Buckel Foundation.

DIVISION OF GRAPHIC ART

ARTHUR BRIDGMAN CLARK, Professor.

CHLOE LESLEY STARKS, Instructor.

The Department of Education offers five main lines of work:

1. Courses of a general nature on the history, function, and administration of public education, intended in part as information courses for the general university student and without reference to the work of teaching. To such students the courses of Groups I and II are recommended.

2. Courses intended to assist other departments in preparing their students for work in secondary schools. All such students should confer with members of the Department of Education as to courses, but in general courses 1, 2, 3, 20, and 24 are recommended, if the candidate has not had experience in teaching. Three units of work in courses relating to secondary-school work are required under the regulations of the California State Board of Education for the high school teacher's recommendation, as are courses 27 and 28, if the candidate has not had previous experience in teaching. (For a more detailed statement, see *Register*, pp. 87-90.)

3. Courses primarily for major students, or those making Education a minor, and intended to give special preparation to (a) those who desire to become teachers of Education in normal schools or colleges, (b) those who wish to prepare for supervisory or administrative positions in the public schools, elementary or secondary, and (c) those who wish to prepare for special educational work in the elementary or secondary field.

4. Courses and research work in the psychology and pedagogy of exceptional children. Two lines of work are offered in this field: (a) elementary courses designed to give prospective superintendents and principals a general acquaintance with the problems of special education, and (b) research courses for the advanced student who looks forward to work as clinical psychologist in the public schools or in institutions for defectives or delinquents. The Dr. C. Annette Buckel

Foundation, supplemented by additional support from the Board of Trustees of the University, has provided for a "research fellowship in the psychology and pedagogy of backward children."

5. Courses for the preparation of teachers of drawing for the public schools, and for the general training of college students in artistic perception and graphic expression. (See division of Graphic Art.) Students may enroll as major students in this division, beginning with the freshman year.

The courses in Education are open to all students as electives or as minor subjects, but only those who desire to prepare for one of the lines of work mentioned above under (3) or (4), and whose preparation and experience are satisfactory to the Department, will be accepted as major students. In the future only graduates of normal schools or other teachers' training schools, and those having had teaching experience and having junior standing, will be accepted as major students in Education during the two undergraduate years. Graduate work in Education is open to all properly qualified students, without these restrictions.

MAJOR REQUIREMENTS

Major students begin their work in Education with the junior year, taking courses 1, 2, and 3. Psychology 1 and 2a should also be taken this same year. Collateral work will be advised to meet individual needs, as determined by the programme of study the student wishes to follow. Students coming with advanced or graduate standing from other universities, where the curriculum does not parallel that offered here, may have substantially equivalent preparation or experience accepted in lieu of the courses required here.

The requirements for the baccalaureate degree cover only introductions to the different fields of Education, and it is assumed that those proposing to offer themselves for responsible positions in educational work will proceed at once to the Master's degree. For this at least twenty units in advance of the baccalaureate requirements, together with the presentation of a satisfactory thesis, will be required. Work in Group I will not be included, and ordinarily one-half of the twenty units must be work listed under Group IV. The completion of the first year of graduate study should mean a somewhat general acquaintance with the different divisions of Education, together with the beginnings of specialization in some one of these. Those who desire to prepare properly for the type of positions indicated under 3 or 4, should proceed to the doctorate.

During the second year of graduate study the student will be expected to attain a mastery of the literature and practice in two of the

following divisions of the subject: (1) History of Education, (2) Elementary or Secondary Education, (3) Administration of Education, (4) Educational Psychology and Theory, (5) Educational Hygiene. Students intending to proceed to the doctorate, either at once or later, should select one of these divisions as a major and one as a minor; complete in large part the required work in a second minor, outside of the Department; pass off the modern language requirements; and get well started on the dissertation.

LIBRARY AND PRACTICAL FACILITIES

The general university library contains the important recent books, and files of the more important educational magazines, both American and foreign. The collection of early American educational magazines and reports is also good. The special library of the Department, consisting of about 7500 volumes, contains one of the most complete collections of American state and city school reports to be found in the United States, the library ranking probably third in this respect. It is also rich in old college and normal school catalogues and text-books of much historical value. The collection of old and present-day school text-books is also large and valuable.

In practical facilities the department has good working connections with the State Normal School at San Jose, and with the public schools of the immediate vicinity. For more important studies by advanced students the large school systems in the vicinity of the University can be used.

The department is also provided with a research laboratory for use in connection with the Buckel Foundation. This is well equipped with the apparatus, blanks, and other materials used in mental and physical tests.

I. ELEMENTARY AND INTRODUCTORY COURSES

[Open to any one with teaching experience, and to all others except first-year students.]

1. **Public Education in America.**—A study of the development of the province, and some of the more important problems of public education in the United States. An introductory course. Lectures, following a syllabus, with assigned readings.

3 units, autumn quarter (CUBBERLEY)

MWF 11

2. **Educational Theory.**—An introductory course dealing with topics fundamental to education, such as biological infancy, human development and culture, education and the social order, individual differences.

assigned topic, embodying the results of independent work. The consent of the instructor is necessary before registering.

1 unit, any quarter.

61. Criticism and Supervision of Instruction.—A few advanced students, who have had sufficient teaching experience, will be allowed to undertake the personal investigation, in the schools of the vicinity, of problems in instruction or supervision. Collateral reading and detailed written reports will be required. Enrollment only after conference with the instructor concerned.

1 unit, autumn or winter or spring quarters (SEARS, PROCTOR)

62. Special Courses.—Special work in independent investigations will be provided for students prepared to do advanced work, the nature of the investigation being determined by the student's preparation and needs. Candidates for advanced degrees will ordinarily register their thesis under this course, the number of units of credit being subject to individual arrangement. The members of the instructing staff stand ready to supervise independent investigations in the following fields:

(a) History and organization of American Education. (SEARS)

(b) Problems in state, county, and city school administration.

(CUBBERLEY)

(c) Problems in educational theory. (DAVIDSON)

(d) Problems in elementary and rural education. (SEARS)

(e) Problems in the organization and administration of secondary education. (———)

(f) Problems in mental development, educational psychology, and school hygiene. (TERMAN)

V. COURSES FOR TEACHERS OF SPECIAL SUBJECTS

A number of special courses of instruction, and groupings of courses, designed to prepare teachers for special work in the public schools, are being arranged, concerning which a special bulletin will be issued later. These include courses designed to prepare commercial teachers, manual arts teachers, teachers of home economics (in connection with the Santa Barbara or San Jose State Normal Schools), etc. The following course in this group will be offered:

A. Commercial Teachers' Training.—A demonstration course in teaching the standard high school commercial subjects, laying emphasis on the practical side of the work, office routine, and management—the training of the private secretary rather than the mere clerk or amanuensis. The course is designed to be of special interest to teachers; stu-

dents preparing to teach the commercial branches should take the course after having completed Economics 3, 51a, and 51b.

4 units, summer quarter (G. A. CLARK)

MTWF

VI. COURSES IN OTHER DEPARTMENTS

The following Teachers' Courses, in other departments, are designed for students preparing to teach these special subjects in secondary schools. Such courses are usually necessary for the departmental recommendation, and may be counted to the extent of four and a half units as part of the work required in Education for a Teacher's Recommendation.

- a. TEACHER'S COURSE IN GREEK.—[See Department of Greek.]
- b. TEACHER'S COURSE IN LATIN.—[See Department of Latin.]
- c. TEACHER'S COURSE IN GERMAN.—[See Department of German Languages.]
- d. TEACHER'S COURSE IN FRENCH.—[See Department of Roman Languages.]
- e. TEACHER'S COURSE IN ENGLISH.—[See Department of English.]
- f. TEACHER'S COURSE IN HISTORY.—[See Department of History.]
- g. TEACHER'S COURSE IN DRAWING.—[See division of Graphic Art.]
- h. TEACHER'S COURSE IN ELEMENTARY PHYSICS.—[See Department of Physics.]

DIVISION OF GRAPHIC ART

The work aims primarily to prepare students for positions as teachers of drawing and art in secondary schools. Many of the courses are also suitable for the practical and general cultural needs of students in other departments.

Intending teachers of art should register with Education as their major subject. The art work of such students should be somewhat as follows:

FIRST YEAR.—Autumn quarter: Still-Life, 4 units; Perspective, 3 units.
Winter quarter: Linear Drawing, Lettering (Engineering 1, 2 units. Spring quarter: Organic Form, 3 units.

SECOND YEAR.—Autumn quarter: Design (3), Pottery or Textile (2), 5 units. Winter quarter: Metal Work, 3 units. Spring quarter: Landscape, 4 units.

THIRD YEAR.—Autumn quarter: Renaissance Painters, 3 units. Winter quarter: Art of the Home, or Metal Work, 3 units; Machine Drawing (M. E., 12), 3 units. Spring quarter: Science Drawing, 3 units.

FOURTH YEAR.—Autumn quarter: Textiles, 3 units; seminar, 1 unit. Winter quarter: Art of the Home (if not before taken), or Metal Work, 3 units; Modern Painters, 3 units.

FIFTH YEAR.—Autumn quarter: Advanced Design, 4 units; Pottery or Textiles, 4 units. Winter quarter: Teachers' Course, 4 units; special problems in art education and thesis (during autumn and winter quarters), 18 units.

Students wishing to qualify themselves for the Special Certificate as Teachers of Art, as granted by the State Board of Education (see *Register*, page 89) may do so by completing 180 units for the A. B. degree, 68 of which must be in Graphic Art, and 24 units (including course 10 in Graphic Art) in Education.

All students are advised in addition to completing this major to obtain the teacher's recommendation also in two minor subjects.

By attending the summer quarters the time of the above programme, either for the "special" or regular teacher's certificate, may be materially shortened.

1. **Still-Life.**—Fundamental principles, in blocking, proportion, and light and shade; materials: charcoal and colored crayon. Open to all students.

4-3 units, autumn and spring quarters (STARKS)

(autumn) MTWTh 1:05-4:05; (spring) WThF 1:05-4:05

2. **Landscape.**—Working out-of-doors in pencil, charcoal, and colored crayon. Open to all students who have had the equivalent of course 1.

3 to 4 units, spring quarter; 3 to 5 units, summer quarter (STARKS)

(spring) MTWTh 1:05-4:05; (summer) MTWThF 1:05-4:05

3. **Organic Form.**—Drawing shells, leaf sprays, animal forms, etc., with reference to discipline in accuracy, and the perception of decorative arrangement. Preparation for course 4. Open to all students.

3 to 4 units, spring quarter (STARKS)

TWThF 1:05-4:05

4. **Design.**—Exercises in the principles of space filling, borders, squares, surface patterns, etc. Intended to accompany execution of work in pottery, textiles, or metal. Three units of technical work, preferably course 3, a prerequisite.

3 to 4 units, autumn quarter; 3 to 5 units, summer quarter (CLARK)

(autumn) MTWTh 1:05-4:05; (summer) MTWThF 9-12

5. **Art of the Home.**—A study of taste, convenience, and economy in house designing and furnishing; types of exteriors, arrangement of

50. The Elementary School Curriculum.—A study of the principles underlying the organization of subject matter for courses in the elementary school, including a critical examination of curricula, syllabi, and school texts in the light of their function in the teaching and administration of the curriculum.

5 units, summer quarter (SEARS) MTWThF 9

51. Organization and Supervision of Elementary Education.—This course will deal with the more important problems of organization, management, and supervision of the elementary school, including such topics as grade, departmental, group, and individual systems of class organization; typical promotion schemes; program making; time allotment; grades and marks; records and reports; attendance, and the practical use of pedagogical tests in the supervision of instruction.

5 units, winter quarter (SEARS) MTWThF 10

55a. Experimental Pedagogy.—A survey of the experimental and statistical studies bearing upon the teaching of the elementary and secondary school subjects. The course should ordinarily be preceded by the courses in Educational Statistics (35) and Experimental Psychology (Psychology 2a). Open by permission.

3 units, winter quarter (DAVIDSON) MW 2:05-4:05

55b. Experimental Pedagogy.—A continuation of 55a, with more attention to special and individual studies.

3 units, spring quarter (DAVIDSON) MW 2:05-4:05

55c. Experimental Pedagogy.—An abridged one-quarter course intended for summer quarter students. Students may enter the second half on permission of the instructor.

3 units, summer quarter (DAVIDSON) TTh 2:05-4:05

57a. Intelligence Tests and the Psychology of Endowment.—The first quarter will be devoted to a critical survey of the literature of mental tests, with special reference to the psychological principles of measuring intelligence. Prerequisites: General and Experimental Psychology, and Educational Psychology (33a and 33b), or its equivalent.

4 units, autumn quarter (TERMAN) TTh 1:05-3:05

57b. Intelligence Tests and the Psychology of Endowment.—A continuation of 57a. During the second quarter practice will be given in mental testing and the treatment of data.

4 units, winter quarter (TERMAN) TTh 1:05-3:05

60. Thesis Work.—In certain courses, students may be given an additional unit of credit on presentation of a satisfactory thesis on an

Especial attention is paid to the needs of individual students. Open to science students on advice.

3 units, autumn or spring or summer quarters (STARKS)
9-11 by arrangement

10. **Teachers' Course.**—For intending teachers of art. Discussions of the aims and methods in drawing and art instruction, and technical work in preparing courses of study. Open only to senior and graduate students.

4 units, winter quarter (CLARK) TThS 8

11. **Seminar.**—Discussion of special topics and current literature in art education. Open to seniors and graduate students only.

1 unit, autumn quarter (CLARK) T 4-5

ENGINEERING

A. ENTRANCE SUBJECTS

Entering students whose major work is to be in any engineering department should be thoroughly prepared in elementary mathematics, and should have entrance credit in algebra (at least one and one-half units), plane and solid geometry, and plane trigonometry in order to be able to take the first year's work in applied mathematics for engineers. Furthermore, it is advisable for them to have entrance credit in mechanical drawing.

B. GENERAL COURSES

I. APPLIED MATHEMATICS

[See courses announced by Department of Applied Mathematics.]

II. GENERAL TECHNICAL COURSES

1. **Linear Drawing.**—A training in the use of drafting implements to enable the student to construct accurate pencil drawings and make clean-cut ink lines. Open to all students, and required of those whose major subject is in Civil, Mechanical, Electrical, or Chemical Engineering, or in Geology and Mining, whether or not they have entrance credit in mechanical drawing. This requirement is waived, however, for a student who satisfies the instructor that he has had the equivalent of this course, by submitting certified work in linear drawing or by passing a special examination. The instruments and materials for this course cost from twenty to thirty dollars.

1 unit, autumn or winter or spring quarters. (Foss)

Any afternoon (except S) 1:05-4:05

dents preparing to teach the commercial branches should take the course after having completed Economics 3, 51a, and 51b.

4 units, summer quarter (G. A. CLARK)

MTWF 11

VI. COURSES IN OTHER DEPARTMENTS

The following Teachers' Courses, in other departments, are designed for students preparing to teach these special subjects in secondary schools. Such courses are usually necessary for the departmental recommendation, and may be counted to the extent of four and a half units as part of the work required in Education for a Teacher's Recommendation.

- a. TEACHER'S COURSE IN GREEK.—[See Department of Greek.]
- b. TEACHER'S COURSE IN LATIN.—[See Department of Latin.]
- c. TEACHER'S COURSE IN GERMAN.—[See Department of German Languages.]
- d. TEACHER'S COURSE IN FRENCH.—[See Department of Romance Languages.]
- e. TEACHER'S COURSE IN ENGLISH.—[See Department of English.]
- f. TEACHER'S COURSE IN HISTORY.—[See Department of History.]
- g. TEACHER'S COURSE IN DRAWING.—[See division of Graphic Art.]
- h. TEACHER'S COURSE IN ELEMENTARY PHYSICS.—[See Department of Physics.]

DIVISION OF GRAPHIC ART

The work aims primarily to prepare students for positions as teachers of drawing and art in secondary schools. Many of the courses are also suitable for the practical and general cultural needs of students in other departments.

Intending teachers of art should register with Education as their major subject. The art work of such students should be somewhat as follows:

FIRST YEAR.—Autumn quarter: Still-Life, 4 units; Perspective, 3 units.

Winter quarter: Linear Drawing, Lettering (Engineering 1), 2 units. Spring quarter: Organic Form, 3 units.

SECOND YEAR.—Autumn quarter: Design (3), Pottery or Textiles (2), 5 units. Winter quarter: Metal Work, 3 units. Spring quarter: Landscape, 4 units.

THIRD YEAR.—Autumn quarter: Renaissance Painters, 3 units. Winter quarter: Art of the Home, or Metal Work, 3 units; Modern Drawing (M. E., 12), 3 units. Spring quarter: Science Drawing, 3 units.

FOURTH YEAR.—Autumn quarter: Textiles, 3 units; seminar, 1 unit.
Winter quarter: Art of the Home (if not before taken), or Metal Work, 3 units; Modern Painters, 3 units.

FIFTH YEAR.—Autumn quarter: Advanced Design, 4 units; Pottery or Textiles, 4 units. Winter quarter: Teachers' Course, 4 units; special problems in art education and thesis (during autumn and winter quarters), 18 units.

Students wishing to qualify themselves for the Special Certificate as Teachers of Art, as granted by the State Board of Education (see *Register*, page 89) may do so by completing 180 units for the A. B. degree, 68 of which must be in Graphic Art, and 24 units (including course 10 in Graphic Art) in Education.

All students are advised in addition to completing this major to obtain the teacher's recommendation also in two minor subjects.

By attending the summer quarters the time of the above programme, either for the "special" or regular teacher's certificate, may be materially shortened.

1. Still-Life.—Fundamental principles, in blocking, proportion, and light and shade; materials: charcoal and colored crayon. Open to all students.

4-3 units, autumn and spring quarters (STARKS)
(autumn) MTWTh 1:05-4:05; (spring) WThF 1:05-4:05

2. Landscape.—Working out-of-doors in pencil, charcoal, and colored crayon. Open to all students who have had the equivalent of course 1.

3 to 4 units, spring quarter; 3 to 5 units, summer quarter (STARKS)
(spring) MTWTh 1:05-4:05; (summer) MTWThF 1:05-4:05

3. Organic Form.—Drawing shells, leaf sprays, animal forms, etc., with reference to discipline in accuracy, and the perception of decorative arrangement. Preparation for course 4. Open to all students.

3 to 4 units, spring quarter (STARKS) TWThF 1:05-4:05

4. Design.—Exercises in the principles of space filling, borders, squares, surface patterns, etc. Intended to accompany execution of work in pottery, textiles, or metal. Three units of technical work, preferably course 3, a prerequisite.

3 to 4 units, autumn quarter; 3 to 5 units, summer quarter (CLARK)
(autumn) MTWTh 1:05-4:05; (summer) MTWThF 9-12

5. Art of the Home.—A study of taste, convenience, and economy in house designing and furnishing; types of exteriors, arrangement of

only when two or more students elect to pursue the same work.
Open only by permission.

1, 2, or 3 units, autumn or winter or spring quarters (FISH)

By arrangement

B. ENGINEERING ECONOMICS

30. Engineering Economics.—The problem of economic selection, interest, sinking funds, first cost, salvage value and depreciation, elements of cost of service (including amortization), methods of estimating, basis of economic comparison, procedure in economic selection. (Written recitations and problems.)

3 units, spring quarter (FISH)

Rec. MWF

31. Engineering Estimates and Reports.—Each student is assigned the problem of choosing a structure for a stated service. He makes preliminary plans and estimates in connection with two or more structures proposed for the stated service, makes an economic comparison based on the estimated costs, and prepares a report on the object, conditions, methods, and result of his investigation. The object of the course is to offer training in analyzing problems of choosing structures, in the logical planning of the steps of an engineering investigation, in the execution of the steps (including use of references, of cost data, of methods of estimating, and arrangement and record of computation), and in the elements of report writing. Roughly, one-third of the time is devoted to looking up references, one-third to drawing and computing, and one-third to writing and revising the report. Open to those who have completed Civil Engineering 30, and to others by permission.

1, 2, or 3 units, autumn or winter or spring quarters (FISH)

By arrangement

C. RAILROAD ENGINEERING

40. Railroad Surveying.—Recitations: Curves, turnouts, preliminary and location surveys, earthwork. Field and office work: Preliminary survey, profile, and topographic map; paper location, profile and quantities; field location, profile levels, and earthwork cross-sections; profile, cross-sections, and volumes from field location; distribution of material with use of mass curve; overhaul computation. Prerequisite: C. E. 21, or its equivalent. Required of all who are taking Civil Engineering as major.

5 units, spring quarter (FISH)

Rec. TTh 9; Dft. M or W 1:05-4:05; Field ThF 1:05-4:05 or S 8-3

Especial attention is paid to the needs of individual students. Open to science students on advice.

3 units, autumn or spring or summer quarters (STARKS)
9-11 by arrangement

10. Teachers' Course.—For intending teachers of art. Discussions of the aims and methods in drawing and art instruction, and technical work in preparing courses of study. Open only to senior and graduate students.

4 units, winter quarter (CLARK) TThS 8

11. Seminar.—Discussion of special topics and current literature in art education. Open to seniors and graduate students only.

1 unit, autumn quarter (CLARK) T 4-5

ENGINEERING

A. ENTRANCE SUBJECTS

Entering students whose major work is to be in any engineering department should be thoroughly prepared in elementary mathematics, and should have entrance credit in algebra (at least one and one-half units), plane and solid geometry, and plane trigonometry in order to be able to take the first year's work in applied mathematics for engineers. Furthermore, it is advisable for them to have entrance credit in mechanical drawing.

B. GENERAL COURSES

I. APPLIED MATHEMATICS

[See courses announced by Department of Applied Mathematics.]

II. GENERAL TECHNICAL COURSES

1. Linear Drawing.—A training in the use of drafting implements to enable the student to construct accurate pencil drawings and make clean-cut ink lines. Open to all students, and required of those whose major subject is in Civil, Mechanical, Electrical, or Chemical Engineering, or in Geology and Mining, whether or not they have entrance credit in mechanical drawing. This requirement is waived, however, for a student who satisfies the instructor that he has had the equivalent of this course, by submitting certified work in linear drawing or by passing a special examination. The instruments and materials for this course cost from twenty to thirty dollars.

1 unit, autumn or winter or spring quarters. (Foss)

Any afternoon (except S) 1:05-4:05

2. Lettering.—A training in engineering lettering and title making. Open to all students, and required of those whose major is in Civil, Mechanical, Electrical, or Chemical engineering, or in Geology and Mining.

1 unit, autumn or winter or spring quarters (Foss)

Any afternoon (except S) 1:05-4:05

3. Descriptive Geometry.—Embracing that part of the subject relating to points, lines, and planes. Open to students who have completed or are taking solid geometry and Engineering 1 and 2, and required of students whose major is in Civil, Mechanical, Electrical, or Chemical Engineering, or in Geology and Mining.

3 units, autumn quarter (Foss)

Rec. TTh 8 or 10; Dft. M or T or Th or F 1:05-4:05

4. Descriptive Geometry.—Embracing that part of the subject relating to curved surfaces, their tangent planes, intersections, and development. Prerequisites: Engineering 1, 2, and 3. Required of students taking their major in Civil, Mechanical, Electrical, or Chemical Engineering.

3 units, winter quarter (Foss)

Rec. T 8 or 10; Dft. MT or ThF 1:05-4:05

5. Descriptive Geometry.—Warped surfaces, shades, shadow, perspective, and isometric drawings. Prerequisite: Engineering 4. Required of students taking their major in Civil Engineering.

3 units, spring quarter (Foss)

Dft. any three afternoon (except W and S) 1:05-4:05

10. Applied Mechanics.—(a) Lectures and recitations. Strength and elastic properties of the ordinary materials of engineering construction. Simple tension, compression and shear. Flexure, with application to simple, continuous, and non-homogeneous beams. Loading columns, torsion, repeated stress, sudden stress, and resilience. (b) Laboratory: Testing strength and elastic properties of materials and structures. Open to students who have completed first- and second-year courses for engineering students in Applied Mechanics; required of all students having engineering as major subject.

5 units, autumn quarter (Mosser)

Lec. MWF 9; Lab. MWF 10-12, or MT 1:05-4:05, or ThF 1:05-4:05

11. Applied Mechanics.—Continuation of Engineering 10.

5 units, winter quarter (Mosser)

Lec. MWF 9; Lab. MWF 10-12, or MT or ThF 1:05-4:05

12. Hydraulics.—(a) Lectures and recitations. Fluid pressure and equilibrium, flow of water through orifices, over weirs, in open and closed conduits. (b) Laboratory. Calibration of instruments. Measurement of pressure, velocity, and flow and friction loss of water under various conditions. Prerequisite: Engineering 11.

5 units, spring quarter (MOSER)

Lec. MWF 9; Lab. MWF 10-12, or MT or ThF 1:05-4:05

[NOTE.—See also Hydraulic courses listed under Mechanical Engineering.]

LABORATORY FEES.—Courses 3, 4, and 5, \$1 each; 10 and 11, \$2 each; 12, \$4.

CIVIL ENGINEERING

A. TOPOGRAPHIC ENGINEERING

20. Elementary Surveying.—Recitations: Telescope, vernier, magnetic needle, bearings, azimuth, deflections; latitude and departure, area by double longitude and by co-ordinates; stadia, transit lines, locating details; staking out buildings, earthwork computations, stadia topography. Field work: Exercises with tape, transit, and level; pacing and compass survey of field, transit and tape survey of field; transit and tape traverse, stadia traverse, differential and profile levels, stadia topography. Office work: Reducing and plotting field notes and computing areas. Open to students who have completed or are taking Engineering 1 and 2 and have a working knowledge of elementary plane geometry and trigonometry.

5 units, autumn quarter (FISH)

Rec. TTh 9; Dft. M or W 1:05-4:05; Field ThF 1:05-4:05 or S 8-3

21. Advanced Surveying.—Recitations: Base lines, triangulation, trigonometrical leveling, plane table, topographic surveying, topographic cross-sections, earthwork cross-sections and volumes, topographic projection, sun observations, circular curves, land surveys and resurveys, adjustment of transit and level. Field and office work: The exercises in field and drafting room will cover, as thoroughly as time permits, the ground specified under Recitations. Prerequisite: C. E. 20 or its equivalent. Required of students who take their major in Civil Engineering or in Geology and Mining.

5 units, winter quarter (FISH)

Rec. TTh 9; Dft. M or W 1:05-4:05; Field ThF 1:05-4:05 or S 8-3

23. Special Surveying.—Courses arranged to meet special needs of individuals. (Field work, excepting sun observations, can be done

and 5, and those graduates of other institutions who present corresponding credits. Major students are recommended for the degree of Engineer in Electrical Engineering upon satisfactory completion of Electrical Engineering courses 6, 7, 10, and 11, Physics 18, and Applied Mathematics 8 (39 units), and electives as approved (6 to 15 units); total, 45 to 54 units.

1. Electricity in Engineering.—An abridged course in the industrial applications of electricity, intended for non-electrical engineering students. Prerequisites: first seven quarters of any of the Stanford Engineering curricula.

5 units, winter quarter (CLARK) Lec. MWF 11; Lab. TW 1:05-4:05

3. Electrical Machinery.—A laboratory course is the characteristic technology of magnetic, electric, and electrostatic phenomena, introductory study of meters, transformers, machines, and auxiliaries. Prerequisites: Applied Mathematics 1, 2, 3; Engineering 1, 2, 3, 4, 5; Mechanical Engineering 11, 13a, 13b; Physics 6a, 6b, 6c, 6d.

2a. Recitations.

2 units, winter and spring quarters (MULOCK) MW 11

2b. Laboratory Work.

3 units, winter and spring quarters (CLARK, MULOCK)

MThF 1:05-4:05

[Course 2 is supplemented by Physics 6d, laboratory work in electrical measurements, 2 units, autumn quarter.]

3. Electrical Machinery.—A laboratory course in the characteristic performance of standard electrical machinery and auxiliary apparatus. Prerequisite: E. E. 2a, 2b.

4 units, autumn quarter (CLARK, MULOCK)

4. Electrical Engineering.—A lecture course in *general practice*: (1) Standardization authorized by the A. I. E. E. (2) Fire Hazard, National Electrical Code. (3) Transmission Economics. (4) Standard Machinery, Auxiliaries, and Structural Supplies. (5) Municipal Distribution of Electricity for Miscellaneous Service. (6) Long Distance Transmission of Power for General Purposes. (7) Discussion of Typical Installations. (8) Elements of Finance Controlling the Uses of Electricity. (9) Survey of Electrical Industries. (10) Historical and Biographical Sketches. Prerequisite: E. E. 3.

3 units, winter quarter (RYAN) MWF 8

5. Electric and Magnetic Circuits.—Class work: essentially a problem course. Prerequisites: E. E. 3 and 4.

3 units, spring quarter (CLARK) MWF 11

41. Railroad Construction.—Field or office work assigned to individuals, according to their needs, along one or more of the following lines: (1) Supplementary work on simple, compound, and spiral curves, turnouts, connecting tracks, cross-sections, quantities, classification, distribution. (2) Excavating methods and plants. (3) Situation and drainage surveys; preliminary plans and estimates; choice of structure and site; working drawings; staking out; inspection; estimates of work done. (4) Collecting, recording, and filing information; computations and drawings; instructions and reports. A formal, written, detailed report is required on each engineering problem assigned. Open, by permission, to students who have completed Civil Engineering 40 or its equivalent.

1, 2, or 3 units, autumn or winter or spring quarters (FISH)

By arrangement

42. Railroad Location.—Locomotive tractive force and resistances thereto, velocity profile, momentum grade. Traction problems involving inter-relation of train weight, grade, speed, and characteristics of locomotive. Value of change in distance, curvature, rise and fall, and ruling grade, based on analysis of operating expenses. Pusher grades, balanced grades for unequal traffic and for adjacent divisions. Prerequisites: Civil Engineering 30 and 40.

3 units, winter quarter (FISH)

By arrangement

D. STRUCTURAL ENGINEERING

50. Elements of Design.—(1) Materials (see under Metallurgy 1). (2) Analytical and graphical determination of stresses in simple structures. (3) Investigation of distribution of stresses in structural details. Open to students who have completed Engineering 1, 2, 3, 4, and have taken or are taking Engineering 10 and 11 and Metallurgy 1. Required of all students taking their major in Civil Engineering.

3 units, autumn quarter (WING)

WThF 1:05-4:05

51. Elements of Design.—(1) Wood, stone, brick, limes, cement, etc., studied from engineering standpoint. (2) Bearing power of soils, distribution of pressure, and similar details of design of simple foundations. (3) Designs, working drawings, bills of materials, and estimate of cost of some simple structure, such as a mill building or highway bridge. (4) Testing physical properties of cement and other masonry materials. Prerequisite: Civil Engineering 50. Required of all students taking their major in Civil Engineering.

5 units, winter quarter (WING, MOSER)

Lec. MWF 11; Dft. and Lab. WThF 1:05-4:05

ceedings of the Institute, and of other topics as assigned, and the view of current electrical literature.

LABORATORY FEES—\$2 per unit of university credit.

SYLLABUS FEES—Applicable to syllabus, lantern slides, and chair \$1 per course-section.

MECHANICAL ENGINEERING

WILLIAM FREDERICK DURAND, GUIDO HUGO MARX, WILLIAM RANK ECKART, Professors.

EVERETT PARKER LESLEY, Associate Professor.

CHARLES NORMAN CROSS, LAWRENCE EDMISTER CUTTER, Assistant Professors.

EDWARD JOHN STANLEY, JAMES BENNETT LIGGETT, THERON J. PALMATEER, ROBERT HENRY HARCOURT, HORATIO WARD STEBBE, Instructors.

The following courses constitute the required work of a five year curriculum leading to the degree of Mechanical Engineer. Students successfully completing the first four years of this curriculum with sufficient additional grade points for graduation will be granted the degree of Bachelor of Arts. It is expected that the supplemental courses necessary in order to obtain the number of grade points required for graduation will be elected in considerable degree among the other engineering courses offered in the department.

Numbers in parentheses indicate number of credit units for the year.

FIRST YEAR—Applied Mathematics 1 (10); Applied Mathematics (5); Chemistry 1, 3, and 6 (9); Machine Sketching, M. E. 11 (3); Shopwork, M. E. 1 and 3, (8); Industries, M. E. A., (3).

SECOND YEAR—Applied Mathematics 2 (5); Applied Mathematics (10); Physics 6a and 6b (8); Linear Drawing and Lettering, Engineering 1 and 2 (2); Descriptive Geometry, Engineering 3 and (6); Elementary Machine Drawing, M. E. 12 (3).

THIRD YEAR—Applied Mechanics, Engineering 10 (5); Elementary Hydraulics, Engineering 12 (5); Physics 6c and 6d (8); Metallurgy 1 (3); Shopwork M. E. 6 (4); Machine Design, M. E. 13 (8).

FOURTH YEAR—Heat Engines, M. E. 32, 33 (8); Technical Report M. E. 31 (3); Mechanical Laboratory, M. E. 23 (3); Machine Design, M. E. 14 (8); Electrical Engineering, E. E. 3 and 4 (7); Shopwork, M. E. 7 (4).

FIFTH YEAR.—Shop Administration, M. E. 10 (4); Advanced Machine Design, M. E. 16 (4); Mechanical laboratory work, M. E. 24, 25 (6); Applied Thermodynamics, M. E. 34 (3); Central Power Stations, M. E. 35a (3); Hydraulic Machinery and Power Stations, M. E. 35b (5); Pumping Machinery, M. E. 36 (3).

The above courses represent the requirement for the student entering with full entrance credit including Higher Algebra, Solid Geometry, Trigonometry, High School Chemistry, and Woodworking. For those not bringing this measure of entrance credit the requirements will be correspondingly greater. There will be, in the usual case and especially for the student permitted to carry more than the normal number of 15 units registration, a considerable amount of additional time available for elective work in the various engineering departments, or in other departments of the university.

COURSES OFFERED

A. General Survey of Engineering Industries.—Special lectures and assigned topics. Required of first-year students.

1 unit each quarter

By arrangement

1. Forge Practice.—Three laboratory periods and one lecture per week. Required of Mechanical Engineering students.

4 units, winter or spring or summer quarters (HARCOURT)

Lec. S 9

3. Foundry Practice.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or spring quarters. (LIGGETT) Lec S 9

5. Woodworking (prerequisite for M. E. 6).—Three laboratory periods per week. One quarter (3 units) required of students not having entrance credit in woodworking.

3 units, autumn or winter or summer quarters (STANLEY)

6. Pattern Making.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or summer quarters (STANLEY)

Lec. S 8

7. Elementary Machine Shop Practice.—Two laboratory periods and two lectures per week. Intended for upperclassmen only. One

ceedings of the Institute, and of other topics as assigned, and the view of current electrical literature.

LABORATORY FEES—\$2 per unit of university credit.

SYLLABUS FEES—Applicable to syllabus, lantern slides, and chalk \$1 per course-section.

MECHANICAL ENGINEERING

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Numbers in parentheses indicate number of credit units for the year.

FIRST YEAR—Applied Mathematics 1 (10); Applied Mathematics (5); Chemistry 1, 3, and 6 (9); Machine Sketching, M. E. 11 (3); Shopwork, M. E. 1 and 3, (8); Industries, M. E. A., (3).

SECOND YEAR—Applied Mathematics 2 (5); Applied Mathematics (10); Physics 6a and 6b (8); Linear Drawing and Lettering, Engineering 1 and 2 (2); Descriptive Geometry, Engineering 3 and (6); Elementary Machine Drawing, M. E. 12 (3).

THIRD YEAR.—Applied Mechanics, Engineering 10 (5); Elementary Hydraulics, Engineering 12 (5); Physics 6c and 6d (8); Metallurgy 1 (3); Shopwork M. E. 6 (4); Machine Design, M. E. 13 (8).

FOURTH YEAR.—Heat Engines, M. E. 32, 33 (8); Technical Report M. E. 31 (3); Mechanical Laboratory, M. E. 23 (3); Machine Design, M. E. 14 (8); Electrical Engineering, E. E. 3 and 4 (7); Shopwork, M. E. 7 (4).

FIFTH YEAR.—Shop Administration, M. E. 10 (4); Advanced Machine Design, M. E. 16 (4); Mechanical laboratory work, M. E. 24, 25 (6); Applied Thermodynamics, M. E. 34 (3); Central Power Stations, M. E. 35a (3); Hydraulic Machinery and Power Stations, M. E. 35b (5); Pumping Machinery, M. E. 36 (3).

The above courses represent the requirement for the student entering with full entrance credit including Higher Algebra, Solid Geometry, Trigonometry, High School Chemistry, and Woodworking. For those not bringing this measure of entrance credit the requirements will be correspondingly greater. There will be, in the usual case and especially for the student permitted to carry more than the normal number of 15 units registration, a considerable amount of additional time available for elective work in the various engineering departments, or in other departments of the university.

COURSES OFFERED

A. General Survey of Engineering Industries.—Special lectures and assigned topics. Required of first-year students.

1 unit each quarter

By arrangement

1. Forge Practice.—Three laboratory periods and one lecture per week. Required of Mechanical Engineering students.

4 units, winter or spring or summer quarters (HARCOURT)

Lec. S 9

3. Foundry Practice.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or spring quarters. (LIGGETT) Lec S 9

5. Woodworking (prerequisite for M. E. 6).—Three laboratory periods per week. One quarter (3 units) required of students not having entrance credit in woodworking.

3 units, autumn or winter or summer quarters (STANLEY)

6. Pattern Making.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or summer quarters (STANLEY)

Lec. S 8

7. Elementary Machine Shop Practice.—Two laboratory periods and two lectures per week. Intended for upperclassmen only. One

ceedings of the Institute, and of other topics as assigned, and the view of current electrical literature.

LABORATORY FEES—\$2 per unit of university credit.

SYLLABUS FEES—Applicable to syllabus, lantern slides, and char \$1 per course-section.

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Numbers in parentheses indicate number of credit units for the year.

FIRST YEAR—Applied Mathematics 1 (10); Applied Mathematics (5); Chemistry 1, 3, and 6 (9); Machine Sketching, M. E. 11 (3); Shopwork, M. E. 1 and 3, (8); Industries, M. E. A., (3).

SECOND YEAR—Applied Mathematics 2 (5); Applied Mathematics (10); Physics 6a and 6b (8); Linear Drawing and Lettering, Engineering 1 and 2 (2); Descriptive Geometry, Engineering 3 and (6); Elementary Machine Drawing, M. E. 12 (3).

THIRD YEAR—Applied Mechanics, Engineering 10 (5); Elementary Hydraulics, Engineering 12 (5); Physics 6c and 6d (8); Metallurgy 1 (3); Shopwork M. E. 6 (4); Machine Design, M. E. 13 (8).

FOURTH YEAR—Heat Engines, M. E. 32, 33 (8); Technical Report M. E. 31 (3); Mechanical Laboratory, M. E. 23 (3); Machine Design, M. E. 14 (8); Electrical Engineering, E. E. 3 and 4 (7); Shopwork, M. E. 7 (4).

FIFTH YEAR.—Shop Administration, M. E. 10 (4); Advanced Machine Design, M. E. 16 (4); Mechanical laboratory work, M. E. 24, 25 (6); Applied Thermodynamics, M. E. 34 (3); Central Power Stations, M. E. 35a (3); Hydraulic Machinery and Power Stations, M. E. 35b (5); Pumping Machinery, M. E. 36 (3).

The above courses represent the requirement for the student entering with full entrance credit including Higher Algebra, Solid Geometry, Trigonometry, High School Chemistry, and Woodworking. For those not bringing this measure of entrance credit the requirements will be correspondingly greater. There will be, in the usual case and especially for the student permitted to carry more than the normal number of 15 units registration, a considerable amount of additional time available for elective work in the various engineering departments, or in other departments of the university.

COURSES OFFERED

A. General Survey of Engineering Industries.—Special lectures and assigned topics. Required of first-year students.

1 unit each quarter

By arrangement

1. Forge Practice.—Three laboratory periods and one lecture per week. Required of Mechanical Engineering students.

4 units, winter or spring or summer quarters (HARCOURT)

Lec. S 9

3. Foundry Practice.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or spring quarters. (LIGGETT) Lec S 9

5. Woodworking (prerequisite for M. E. 6).—Three laboratory periods per week. One quarter (3 units) required of students not having entrance credit in woodworking.

3 units, autumn or winter or summer quarters (STANLEY)

6. Pattern Making.—Three laboratory periods and one lecture per week. One quarter (4 units) required of Mechanical Engineering students.

4 units, autumn or winter or summer quarters (STANLEY)

Lec. S 8

7. Elementary Machine Shop Practice.—Two laboratory periods and two lectures per week. Intended for upperclassmen only. One

quarter (4 units) required of Mechanical Engineering students. Prerequisites: M. E. 1 and 3.

4 units, autumn or spring or summer quarters (PALMATEER)
Lec. TS

8. Advanced Machine Practice.—One to four laboratory periods per week. Prerequisite: M. E. 7.

1 to 4 units, autumn or spring or summer quarters (PALMATEER)

10. Shop Administration.—A course of lectures on workshop organization and administration, factory accounting, wage systems, selection of machinery, factory methods, etc. Prerequisites: courses 1 to 5 inclusive.

4 units, winter quarter (LESLEY) MTWTh 10

11. Freehand Machine Drawing.—Practice in making freehand sketches of machine parts, and their dimensioning in practical form for use in the shop, the sketches being made according to the principles of orthographic projection. The aim is to train the student in the reading of machine drawings through making a considerable number of sketches from actual machines and machine parts, and at the same time to familiarize him as much as possible with the actual machine parts. Open to all students, and required of students in Mechanical Engineering. (Nine hours a week.)

3 units, winter or spring or summer quarters (CUTTER)
TTh 1:05-4:05; S 9-11

12. Elementary Machine Drawing.—Practice in making working drawings of machine parts, and in making tracings from these drawings. The purpose of the course is, not only to train the student in the technique of drafting and dimensioning, but also to familiarize him with the elements of machines, and, therefore, no drawings are made from copy, but all are made from the student's own sketches of the actual model. (Six or nine hours a week in drafting room; three hours work for one unit credit.) Prerequisite: courses 1, 2, and 3 in Engineering, or their equivalents; and, for Mechanical Engineering students, course 11 in Mechanical Engineering.

2 or 3 units, winter or spring or summer quarters (CUTTER)
MWF 1:05-4:05

13. Elementary Machine Design.

a. Function of machines; motion, force, and work in machines; analysis of mechanisms; velocity, acceleration, and effort diagrams; parallel motions; cams; ratchets; toothed wheels; valve gear analysis; and design. The aim is, not merely to present a course in pure mechan-

ism, or kinematics, but also—by the introduction of the consideration of force, work, and energy, as well as motion—to show the purposes for which the mechanisms are used and the manner in which they function. (Three hours a week, lectures and recitations, winter and spring quarters.) (3 units)

b. Drafting course applying the principles treated in *a.* (Three hours a week drafting, winter and spring quarters.) (1 unit)

Prerequisites: course 12 in Mechanical Engineering and courses 1, 2, 3 and 4 in Engineering. Courses *a* and *b* must be taken together and are required of students in Mechanical Engineering.

4 units, winter and spring quarters (G. H. MARX)

Lec. MWF 8; Drafting W 1:05-4:05

14. Machine Design.—Study of machine elements, such as bolts and screws; riveted joints and boiler design; keys, fits and fitting; axles, shafts, and spindles; journals, bearings, friction, and lubrication; ball and roller bearings; sliding surfaces; couplings and clutches; gear, belt, rope, and chain transmission systems; flywheels; brakes; springs; frames and supports; cylinders, etc.; leading to the design of complete simple machines. (Two hours a week recitation and lectures, six hours in the drafting-room, throughout the year.) Open to students who have completed course 13 in Mechanical Engineering, and who are taking courses 10 and 11 in Engineering; two quarters required of students in Mechanical Engineering.

4 units, autumn, winter, and spring quarters (G. H. MARX)

Lec. TTh 8; Dft. TTh 1:05-4:05

15. Machine Design.—An abridged treatment of the field covered in courses 13 and 14. (Three hours a week recitations and lectures, six hours a week in the drafting-room, first quarter.) Open to students who have completed Engineering 3 and 4, Mechanical Engineering 12, and are taking Engineering 10 and 11. Intended for Engineering students whose major subject is not Mechanical Engineering. [Not given in 1917-18.]

5 units, autumn quarter (G. H. MARX)

Lec. MWF 8; Dft. MW 1:05-4:05

16. Advanced Machine Design.—Design of complete machines. Students may elect machine tools, cranes, steam or gas engines, or special problems. (One lecture and six hours drafting per week.) Intended for fifth-year students who have completed courses 14, 32, and 33.

4 units, summer or autumn quarters (G. H. MARX, CUTTER)

Lec. F 10; Dft. 1:05-4:05 by arrangement

21. Valuation of Fuels and Oils for Engineering Purposes.—Includes determinations of the proximate analysis of coal; the calorific value of coals, fuel oils, and gas; the moisture contents of fuel oils; the density, viscosity, flash, burning, and chill points of oils and the coefficient of friction of lubricated bearings. (One lecture, three hours in the laboratory, and five hours on reports per week.)

3 units, autumn or spring quarters (ECKART, CROSS, STEBBINS)

Lec. F 8; Lab. 1:05-4:05 by arrangement

22. Calibration and Use of Engineering Instruments.—Including thermometers, gas and steam meters, planimeters, steam engine indicators, absorption brakes, transmission dynamometers, steam calorimeters, and speed indicators. (One lecture, three hours in the laboratory, and five hours on reports per week.)

3 units, autumn or winter quarters (ECKART, CROSS, STEBBINS)

Lec. (autumn) W 8, (winter) Th 9; Lab. 1:05-4:05 by arrangement

23. Testing of Engines, Boilers, and Compressors.—Includes valve setting, mechanical efficiency, and economy tests of steam engines, tests of steam turbines, gas engines, boilers (including flue gas analysis), and air compressors. (One lecture, three hours in the laboratory, and five hours on reports per week.)

Open only to students who have completed M. E. 32 (the first quarter of Heat Engines, 4 units); required of students in Mechanical Engineering. It is very desirable that this course be preceded by M. E. 21 and 22, and this will be required of those who expect to do advanced experimental work.

3 units, winter quarter (for majors other than M. E.), and spring quarter (for M. E. majors) (ECKART, CROSS, STEBBINS)

Lec. (winter) W 10, (spring) Th 9; Lab. 1:05-4:05 by arrangement

24. Testing of Hydraulic Machinery.—Includes tests of centrifugal rotary, jet and steam pumps, pulsometers, hydraulic rams, water wheels and hydraulic turbines. (One lecture, three hours in the laboratory, and five hours on reports per week.)

Open to students who have completed Engineering 12b and M. E. 23.

3 units, autumn quarter (ECKART, CROSS, STEBBINS)

Lec. Th 8; Lab. 1:05-4:05 by arrangement

25. Testing of Power Plants and Auxiliaries.—Includes tests of fuel water heaters, economizers, condensers, injectors, blowers, turbo-compressors, refrigerating machinery, and a complete power plant test. (One lecture, three hours in the laboratory, and five hours on reports per week.)

Open to students who have completed M. E. 23 and 24.

3 units, winter quarter (ECKART, CROSS, STEBBINS)

Lec. T 8; Lab. 1:05-4:05 by arrangement

26. Advanced Heat Engine Testing.—Includes valve-setting and equalizing loads of cross compound engines, thermal efficiency tests, Hirn's analysis, and speed regulation of engines, automobile tests, etc. (One lecture, three hours in the laboratory, and five hours on reports per week.)

Open to students who have completed M. E. 23, 24, and 25.

3 units, spring quarter (ECKART, CROSS, STEBBINS)

Lec. T 9; Lab. 1:05-4:05 by arrangement

29. Experimental Investigation of Petroleum Engineering Problems.

3 to 6 units, autumn, winter, and spring quarters

(ECKART, GARFIAS) By arrangement

30. Experimental Investigation of Mechanical Engineering Problems.—Open to all students who have completed M. E. 21, 22, and 23 and whose work has indicated their ability to carry on successfully advanced work of this nature.

3 to 6 units, autumn, winter, and spring quarters

(ECKART, CROSS) By arrangement

31. Engineering Reports and Specifications.—Practice writing, with occasional lectures. Required of fourth-year students in Mechanical Engineering.

3 units, autumn quarter (LESLEY)

Lec. TTh 9

32. Heat Engines.—Mechanical theory of heat and its applications. fourth-year students in Mechanical Engineering.

4 units, autumn quarter (DURAND, STEBBINS)

Lec. MWF 10; office work as arranged

33. Heat Engines.—Continuation and application of course 32. (Three lectures and three hours' office work per week.) Required of fourth-year students in Mechanical Engineering.

4 units, winter quarter (DURAND, STEBBINS)

Lec. MWF 10; office work as arranged

34. Applied Thermodynamics.—Continuation of courses 32, 33. Irreversible operations, flow of gases and vapors, design of turbine nozzles. Application of thermodynamic theory to advanced and special problems. Prerequisite: Course 32. Required of fifth-year stu-

dents in Mechanical Engineering. (Two lectures and three hours' office work per week.)

3 units, spring quarter (DURAND)

Lec. MWF 10; office work as arranged

35. Central Power Stations.—Study of the principal problems presented by the design and operation of modern central power stations driven by heat prime movers. (Two lectures and three hours' office work per week.)

3 units, autumn quarter (DURAND, STEBBINS)

Lec. TTh 9; office work as arranged

35b. Hydraulic Machinery and Power Stations.—Elements of hydraulic machinery with special reference to prime movers and centrifugal pumps. Elements of the design of hydraulic power stations with special reference to modern hydroelectric practice; general control of water in tunnels and penstocks, surge chamber, control of surges and shocks, valves and regulating devices, penstocks and their installation, selection of units, characteristics of impulse and reaction types, speed regulation, installation tests, and special problems. Prerequisite: Engineering 12. (Four lectures and three hours' office work per week.)

5 units, spring quarter (DURAND, STEBBINS)

Lec. MTWTh 9; office work as arranged

36. Pumping Machinery.—Discussion of the principal problems arising in the design and operation of pumping machinery of various types, direct, centrifugal, rotary, propeller; and for various purposes, general service, boiler feed, fire service, mine drainage, irrigation, municipal supply, oil line service, etc. (Two lectures and three hours' office work per week.) Prerequisites: M. E. 32 and Engineering 12.

3 units, winter quarter (DURAND)

Lec. TTh 9; office work as arranged

FEES: Courses 1, 3, 7, \$8.00 each; courses 5, 6, \$6.00 each; course 8, \$2.00 per credit hour; courses 21, 22, 23, 24, 25, 26, \$4.00 each; courses 29, 30, \$1.50 per credit hour; course 35, 50c.

ENGLISH

WILLIAM HERBERT CARRUTH, RAYMOND MACDONALD ALDEN, JOHN S. TATLOCK, Professors.

LEE EMERSON BASSETT, HENRY DAVID GRAY, WILLIAM DINSMORE BRIGGS, Associate Professors.

SAMUEL SWAYZE SEWARD, JR., HOWARD JUDSON HALL, EVERETT WALLACE

16. Advertising.

5 units, autumn quarter (HOFFMAN) MTWF 8

17. Public Speaking.—Practice in the preparation and delivery of speeches adapted to various audiences and occasions, with attention to the style of spoken discourse. Prerequisite: course 7.

2 units, one or more quarters (BASSETT, LEIB)

(Autumn) MWF 10; (winter, spring, 2 sections) MWF 10, TThS 10

18. Public Reading.—A course in the preparation of poems, stories, and scenes from novels and plays for public presentation. Open to a limited number only.

2 units, autumn quarter (BASSETT) M 1:05-3:05

19. Oral Debate.—Practice in the preparation and delivery of oral arguments, chiefly on current public questions. Open to a limited number of students who have had satisfactory experience in public speaking, to be admitted in the order of application.

2 units, autumn, winter, and spring quarters (BASSETT, LEIB) W 2-4

20. Teacher's Course in Oral Expression.

2 units, summer quarter (BASSETT) TTh 1:05

21. Old English.—Elements of Old English Grammar with reading exercises.

4 units, winter quarter (KENNEDY) MTWTh 10

22. English Language.—An outline study of English in the light of its historical development.

3 units, winter quarter (SEWARD) TThS 8

23. Chaucer.—An elementary course, including an outline of Middle English Grammar for the beginner. Open to third-year students who have a reading knowledge of one foreign language.3 units, autumn or summer quarters (KENNEDY, TATLOCK)
MWF 1:05**24. Spenser.**—Primarily for fourth-year students of the English department.

3 units, winter quarter (BRIGGS) MWF 9

25. Milton.

3 units, one quarter (BRIGGS) [Not given in 1917-18.]

26. Wordsworth.

3 units, autumn quarter (HALL) MWF 9

27. Introduction to Comparative Literature.—An exposition of the comparative method in literary study, with a survey of the distribution

State requirements as set forth on pages 88-89 of the *Register*. Recommendation by the department is granted by vote to students whose work has been of high character. It should be distinctly understood that a mere passing grade does not entitle a candidate to the endorsement of the department. The undergraduate courses usually prescribed are Vocal Expression, Shakespeare, Chaucer, Versification, English Language, Teachers' English, a full year's course in English literary history, and a half-year course in a literary type. The graduate courses must comprise not less than four units of work for each semester of study.

ADVANCED DEGREES

The candidate for the Master's degree in English must have: (1) The equivalent of the requirements for the A. B. degree in English; (2) an elementary knowledge of Old English; and (3) a reading knowledge of two foreign languages (preferably one ancient and one modern).

The work for the degree must occupy at least one full year of graduate study in residence, the greater part in English, the remainder in related fields. The courses in English will be divided between literature and philology. The candidate must present a thesis prepared under the direction of a member of the department and demonstrating the candidate's power of concentrated, independent study. This thesis may be accepted in lieu of not more than six units of the work in course.

For the conditions of acquiring the Doctor's degree, see the Graduate Study Bulletin.

PRELIMINARY AND GENERAL COURSES

[In general, courses 1-15 are open to first-year students; courses 16-30 are open to second-year students.]

A. Elementary Composition.—A one-quarter course required of all first-year undergraduates who do not pass the matriculation test in English.

1 unit, autumn or winter quarters (MIRRIELES, BAILEY, BRADFORD)
(Autumn, 2 sections) MWF 8, 9; (winter) MWF 8

[For each student in course A, except in case of those who meet the requirement within a short time, a fee of \$10 is charged.]

2. English Composition.—Practical work in narration and description, one quarter; in exposition, one quarter. Membership in this course being limited to 180, students will be accepted in order of registration up to 5 p. m., October 1st (for details, see bulletin board).

English majors are expected to enroll in section I, Journalism students in section II (see schedule).

3 units, any two quarters (CARRUTH, GRAY, SEWARD, HALL, SMITH, EVANS, BAILEY, BRADFORD)

(Autumn, winter, spring 5 sections) MWF 8, 9, 10, 11, TThS 9;
(summer) MWF 8

4. Vocal Expression.—A study of the principles of expressive reading, and the vocal interpretation of masterpieces in prose and poetry, with supplementary work in voice development. Each student is expected to memorize and vocally interpret some 350 lines of Shakespeare during the quarter. The course is open to a limited number of students in the order of their application. Application should be made before the first meeting of the class in the quarter, and the instructor reserves the right to refuse to enroll students who do not appear at the first session of the class. Two sections.

4 units, any quarter (BUCKINGHAM, ———) TWThF 8, 9

5. Reading Aloud.—Practice in the application of the fundamental principles of effective reading to varied types of literature. Prerequisite: course 4.

3 units, autumn or winter or spring quarters (BUCKINGHAM)
MWF 9

6. Practical Phonetics.—A course in the enunciation and pronunciation of the English language. Designed especially for foreign students.

1 unit, autumn quarter (BASSETT) M 2:05

7. Extemporaneous Speaking.—Practice in extemporaneous speaking on subjects of current interest, with some attention to the preparation of speech outlines.

3 units, autumn or winter or spring quarters (BASSETT, EVANS, LEIB)

(Autumn, 3 sections) TThS 9, 10, MWF 1:05; (winter, 3 sections) TThS 9, MWF 9, 1:05; (spring, 3 sections) MWF 9, TThS 9, MWF 1:05

8. Outline History of English Literature.—A survey, critical and historical, of English literature in its larger aspects, with readings. Designed primarily for first-year English major students who have not taken a high school course in the subject.

5 units, winter quarter (MIRRIELES) MTWThF 8

9. American Literature.—General survey of the history of American literature, with reading of selected representative works. For

95 The Bible in Early English.

3 units, spring quarter (KENNEDY)

MWF —

96. Ballads.

4 units, spring quarter (BRIGGS)

W 2:05-4 —;

98. Teachers' Course in English.—A study of the methods of teaching Composition (first quarter) and Literature (second quarter) in secondary schools. Open to fourth-year students.

3 units, two quarters, or 5 units, one quarter (SEWARD)

(Autumn, winter) W 2:05-4:05, M 1:05; (summer) MTWThF 10

99. Versification.—An introduction to the theory of rhythm and metre, the history of English prosody, and the problems of reading and teaching verse. Open to fourth-year students and graduates; to third-year students by special permission.

3 units, autumn quarter (ALDEN)

MWF 10

GRADUATE COURSES

[Open also by consent of the instructor to advanced undergraduates.]

101. Introduction to English Philology and Bibliography.

3 units, autumn quarter (KENNEDY)

MWF 9

103. Tragedy.—A comparative study of the theory and practice of tragedy in various literatures.

3 units, autumn and winter quarters (ALDEN)

Th 2:05-4:05 (and a 3d hour by arrangement)

104. Comedy.—An inquiry into the nature of the comic and into its literary uses, as exemplified especially in the drama.

3 units, two quarters (SEWARD)

[Not given in 1917-18.]

105. Elizabethan and Seventeenth Century Lyric.—Special emphasis is laid on the Sonnets of Shakespeare and his contemporaries, and on the religious lyric of the age of Herbert.

4 units, summer quarter (ALDEN)

MTWTF 10

106. Critical Theories.

3 units, autumn quarter (SEWARD)

T 2:05-4:05; F 1:05

107. Tennyson.—The Idylls of the King compared with their sources.

3 to 5 units, summer quarter (CARRUTH)

TTh 2:05-4:05

108. The Hildebrand Theme in General Literature.—A study of the source and migration of epic themes.

3 units, autumn quarter (CARRUTH)

T 1:05; F 2:05-4:05

of the class will vocally interpret characters and scenes assigned for individual study. Prerequisite: course 19a.

3 units, spring quarter (BASSETT) MWF 1:05

20. Practical Debate.—Under supervision of the department those students who make the practice squads for any intercollegiate debate may receive credit, upon satisfactory completion of the work.

1 or 2 units, any quarter (LEIB) By arrangement

22. Victorian Prose.—A survey of Victorian prose, with special emphasis upon Carlyle, Ruskin, and Arnold. (Course 22 is a half-course with course 23; either may be taken separately.)

2½ units, summer quarter (SEWARD) MTWThF 9

23. Victorian Poetry.—A study of selected Victorian poets.

2½ units, summer quarter (SEWARD) MTWThF 9

24. English Bible.—Representative portions of the Bible studied as literature, with some consideration of the history and the prose style of the English versions. Not open to first-year students.

4 units, autumn quarter (GRAY) MTWTh 10

25. Shakespeare.—The first quarter's work consists of a rapid reading of a considerable number of the plays in chronological sequence. The second quarter is devoted to a careful study of three or four plays. Open in the first quarter to all second-year students; in the second quarter to English majors and such others as show special interest and aptitude.

4 units, one or two quarters (GRAY, ALDEN)
(Winter, spring) MTWF 10; (summer) MTWF 11

27. Browning.—Open only to students especially recommended.

2 units, one half summer quarter (GRAY) TWThF 9

ADVANCED AND SPECIAL COURSES

[Unless otherwise specified, the following courses are open to third-year and fourth-year students of all departments.]

31. Exposition.—An advanced course. Special attention will be given to students preparing theses or other papers. Prerequisite: course 2 or equivalent.

3 units, autumn or summer quarters (HALL)
(Autumn) MWF 8; (summer) TThS 9

32. Argumentation.—The theory of argumentation, with practice in the preparation of briefs and forensics. Open to all students who have made a satisfactory grade in English 2.

2 units, autumn, winter, and spring quarters (BRIGGS, LEIB)
WF 2:05

under the direction of the instructor in journalism provision is made for a just amount of credit for such work.

CURRICULUM

(a) English (23), Economics (22), History (22), Journalism (23) total, 90 units.

(b) Selection from at least five of the following divisions: Biology, Physical Science, Geology, Astronomy, Physiology and Hygiene, Philosophy and Psychology, Sanitary Engineering, Law, Medical Theology, Education; total, 45 units.

(c) Margin to complete requirements of major department, and free choice, 45 units.

[A tentative working schedule of a four-years' curriculum in accordance with this outline will be furnished on application to the department.]

COMPARATIVE LITERATURE

The following courses offered by the various departments of literature in the University pursue the comparative method and contribute to a survey of the literature of the world and the relations of the several literatures to one another. English majors are advised to elect as many as possible of these courses. Detailed description and the conditions of election are given under the respective departmental announcements.

INTRODUCTION TO COMPARATIVE LITERATURE. [English 65.]

THE ENGLISH BIBLE. [English 24.]

GREEK LITERATURE. [Greek 21 and 22.]

LATIN LITERATURE. [Latin 32.]

EARLY ENGLISH AND GENERAL MEDIEVAL LITERATURE. [English 81.]

HISTORY OF GERMAN LITERATURE. [German 81.]

THE REVOLUTIONARY ERA. [English 85.]

THE 18TH CENTURY. [English 83 and 84.]

THE VICTORIAN ERA. [English 22 and 23.]

NATIONAL EPICS. [English 66.]

THE GREEK EPIC. [Greek 18.]

THE HILDEBRAND THEME. [English 108.]

DANTE AND THE DIVINE COMEDY. [Romanic Languages C 51.]

CHAUCEER. [English 58 and 95.]

TENNYSON: THE SOURCES OF THE IDYLLS OF THE KING. [English 107.]

THE HISTORY OF PROSE FICTION. [English 67.]

ENGLISH FICTION. [English 68.]

- THE MODERN NOVEL. [English 69.]
DEVELOPMENT OF THE GERMAN NOVEL. [German 87.]
THE FRENCH NOVEL IN THE 19TH CENTURY. [Romanic Languages
A60.]
THE DEVELOPMENT OF TRAGEDY. [English 103.]
COMEDY. [English 104.]
GREEK TRAGEDY. [Greek 19.]
ROMAN COMEDY. [Latin 10.]
THE ENGLISH DRAMA TO 1642. [English 70.]
THE MODERN DRAMA. [English 71.]
ORIGINS OF THE SPANISH THEATER. [Romanic Languages 27.]
DEVELOPMENT OF THE GERMAN DRAMA. [German 86.]
THE FRENCH DRAMA IN THE 19TH CENTURY. [Romanic Languages
A 61.]
BALLADS. [English 96.]
THE ENGLISH LYRIC. [English 105.]
DEVELOPMENT OF LYRIC POETRY. [German 88.]
LATIN SEMINARY: EPIC POETRY. [Latin 22.]
GREEK SCULPTURE. [Greek 26.]
ROMAN ART AND ARCHAEOLOGY. [Latin 31.]
HISTORY OF GERMAN CIVILIZATION. [German 137.]
LIFE AND THOUGHT OF THE 16TH AND 17TH CENTURIES. [English 87.]
AMERICAN POETRY IN RELATION TO EUROPEAN. [English 90.]

ENTOMOLOGY AND BIONOMICS

VERNON LYMAN KELLOGG, Professor.
RENNIE WILBUR DOANE, Associate Professor.
MARY ISABEL MCCracken, Assistant Professor.
GORDON FLOYD FERRIS, Assistant in Instruction.

1a. **Elementary Entomology.**—An introduction to the study of entomology intended to give the student a general knowledge of the structure, development, and classification of the orders of insects having incomplete metamorphosis. Includes a study of the grasshopper, and a comparative study of representative insects of other groups having similar methods of development. Laboratory and field work, with occasional lectures. Open to all students. (Twelve and one-half hours a week.) (During the autumn quarter of 1917-18, this course will be given in two sections, one in the forenoon, the other in the afternoon.)
5 units, autumn or spring or summer quarters (McCracken, Ferris)

1b. Elementary Entomology.—A continuation of Course 1, but not necessarily preceded by it. Includes the study of a beetle as a type of an insect with complete metamorphosis and a comparative study of representative insects of other groups having similar methods of development. Open to all students. (During the winter quarter of 1917-18, this course will be given in two sections, one in the forenoon and the other in the afternoon.)

5 units, winter or summer quarters (McCracken, Ferris)

2. Classification of Insects.—This course includes a study of insects in the field and the collection and classification of representative insects of as many families as possible. The purpose of the course is to increase the student's knowledge of the insect fauna of this region and to acquaint him with the aims and methods of systematic work. Must be preceded by course 1a or 1b.

5 units, spring quarter (McCracken, Ferris) Afternoon

3. Insect Ecology.—A study of the structure, habits, and adaptations of a selected group of insects and their relations to their environment. This course offers an introduction to the study of insects for teachers of nature study or high school biology. Open to students who have not had courses 1 or 2.

5 units, summer quarter (McCracken) Afternoon

4. General Entomology and Insect Adaptations.—A course of lectures and demonstrations. Open to students who have had some work in biology.

3 units, autumn quarter (Kellogg) Lec. MWF

5. Insects and Disease.—A discussion of the insects that cause and disseminate some of the diseases in man and the domestic animals. Lectures and demonstrations. Open to students having some previous training in biology.

3 units, winter quarter (Doane) MWF

6. Honey-bee and Apiculture.—Study of the honey-bee; its structure and activities and an introduction to practical bee-keeping through work in a small apiary. Open to students who have had courses 1 or 2 or their equivalent. [Not given spring quarter, 1917-18.]

3 units, spring or summer quarters (McCracken)
Hours by arrangement

7. Economic Entomology: Coccidae (the Scale Insects).—A study of the classification, general biology, and economic relations of the scale insects, with particular attention to the more important injurious

ones of the Pacific Coast. Field, laboratory, and bibliographic work, with occasional lectures. Must be preceded by courses 1 and 2.

3 units, winter quarter (DOANE) MWF afternoons

8. Economic Entomology: Aphididae (the Aphids).—Systematic and biologic studies of the aphids, or plant-lice. [Not given in 1917-18.]

3 units, autumn quarter (FERRIS)

9. Economic Entomology: Forest Insects.—A study of the insect enemies of forest and shade trees. The course includes field, laboratory, and bibliographic work. Should be preceded by course 7.

3 units, autumn quarter (DOANE) MWF afternoons

10. Economic Entomology: Orchard and Garden Insects.—A study of the principal injurious and beneficial insects of the orchard and garden. Includes field, laboratory, and bibliographic work, and a weekly lecture on the history, principles, and practice of economic entomology. Should be preceded by course 7.

3 units, spring quarter (DOANE) MWF afternoons

11. Taxonomy.—In this course the student is afforded an opportunity to classify material which he has collected or which is in the museum of the department. It is intended to increase his knowledge of systematic entomological literature and to train him in taxonomic methods.

Autumn, winter, and summer quarters (McCRACKEN)

Hours and time by arrangement

12. Insect Histology and Histologic Technic.—The study of the histology of insect tissues and organs, and the special methods of such study.

3 units, autumn quarter (KELLOGG) Forenoon hours

13. Advanced Economic Work.—Studies of one or more groups of insects of economic importance, including systematic ecological investigations and methods of controlling the injurious species. Field, laboratory, and library work, with occasional lectures. Intended for students fitting themselves for practical work in Economic Entomology. Open to advanced students.

Autumn or winter or spring quarters (DOANE)

Hours and time by arrangement

14. Advanced Biologic Work.—Advanced study and investigation of the biology of insects. Laboratory and field work.

Autumn or winter or spring quarters (KELLOGG)

Hours and time by arrangement

BIONOMICS

14. Organic Evolution.—Lectures on the laws or principles of biology and the factors in organic evolution. Not open to first- and second-year students.

3 units, winter quarter (KELLOGG) MWF 9

16. Heredity.—A discussion of the modern knowledge of heredity with special reference to human inheritance. Not open to first- and second-year students.

3 units, spring quarter (KELLOGG) MWF 9

Work for graduate and special students will be specially arranged.

Major students in Entomology must obtain before graduation forty-five units of credit in Entomology, and credit for course 1 in Zoology, and course 1 in Botany.

The ENTOMOLOGICAL COLLECTIONS contain authoritatively determined specimens, accessible for comparison, in all of the insect orders, and include many sets of specimens illustrating the development and habits of insects. There is included, also, the most important existing collection of North American Mallophaga, comprising the types of four-fifths of all the species so far described from North America and the Pacific Islands, an unusually large collection of Coccidae (scale insects), and valuable series of specimens from the Galapagos Islands, Samoa, and the Philippine Islands.

LABORATORY FEES.—\$2.50 per quarter for each laboratory course.

GEOLOGY AND MINING

GEOLOGY AND PALEONTOLOGY

BAILEY WILLIS (Geology), JAMES PERRIN SMITH (Paleontology),
Professors.

AUSTIN FLINT ROGERS (Mineralogy), CYRUS FISHER TOLMAN, JR.,
(Economic Geology), Associate Professors.

MINING AND METALLURGY

DAVID MORRIL FOLSOM (Mining), Professor.

†GALEN HOWELL CLEVINGER (Metallurgy), Research Professor.

HAYES WILSON YOUNG, WALDEMAR FENN DIETRICH (Metallurgy),
VALENTINE RICHARD GARFIAS (Petroleum Technology), Assistant
Professors.

Students intending to pursue their major subject in the Department of Geology and Mining should offer as a part of their entrance preparation solid geometry, trigonometry, advanced algebra, physics, and chemistry; otherwise the mathematics, physics, and chemistry must be taken in the University.

Courses of study in the Department of Geology and Mining lead to the degree of Bachelor of Arts on completing four years of study, or the equivalent of one hundred and eighty units of credit. The degree of Engineer is given in Mining or Metallurgy on completion of an additional year, or to the equivalent of forty-five additional units of credit, including a thesis. Or the degree of Master of Arts may be secured at the close of the fifth year's work, including a thesis, in accordance with the regulations of the University (Register p. 83). The degree of Doctor of Philosophy is given on completion of the required additional work under the conditions stated in the Register (p. 84). The requirement that the work shall be done in residence may in part be waived on recommendation of the department when the needs of original investigation cannot be met at the University.

COURSES OF STUDY

The following is a list of the studies offered in the department. They are grouped under the heads of Geology, Mineralogy, Economic Geology, Paleontology, Mining, and Metallurgy. Certain elementary courses in the department are required of all students, as indicated: Geography 1; Geology 1, 2, 3; Economic Geology 1, 2; Mineralogy 1; Paleontology 2, 3. Other courses are elective, except that no study may be taken without proper preparation, and should be selected only after conference with the instructors. At least sixty units of work in the department will be required for the degree of Bachelor of Arts of all students intending to follow the profession of geology and mining.

GEOLOGY

Geography 1: Physical Geography.—A lecture course on the aspects of the earth, treating of the facts, causes, and laws of physical geography; intended to give the student a knowledge of the physical world as the abode of man. Required of all majors in Geology and Mining; open to students from any other department.

4 units (for Geology majors), 3 units (for other majors), autumn
quarter (WILLIS) TThS 8

†Absent on leave, autumn quarter, 1917-18.

BIONOMICS

14. Organic Evolution.—Lectures on the laws or principles of biology and the factors in organic evolution. Not open to first- and second-year students.

3 units, winter quarter (KELLOGG)

MWF

16. Heredity.—A discussion of the modern knowledge of heredity with special reference to human inheritance. Not open to first- and second-year students.

3 units, spring quarter (KELLOGG)

MWF

Work for graduate and special students will be specially arranged.

Major students in Entomology must obtain before graduation forty-five units of credit in Entomology, and credit for course 1 Zoology, and course 1 in Botany.

The ENTOMOLOGICAL COLLECTIONS contain authoritatively determined specimens, accessible for comparison, in all of the insect orders, and include many sets of specimens illustrating the development and habits of insects. There is included, also, the most important existing collection of North American Mallophaga, comprising the types of four-fifths of all the species so far described from North America and the Pacific Islands, an unusually large collection of Coccidae (scale insects), and a valuable series of specimens from the Galapagos Islands, Samoa, and the Philippine Islands.

LABORATORY FEES.—\$2.50 per quarter for each laboratory course.

GEOLOGY AND MINING

GEOLOGY AND PALEONTOLOGY

BAILEY WILLIS (Geology), JAMES PERRIN SMITH (Paleontology),
Professors.

AUSTIN FLINT ROGERS (Mineralogy), CYRUS FISHER TOLMAN, JR.,
(Economic Geology), Associate Professors.

MINING AND METALLURGY

DAVID MORRIL FOLSOM (Mining), Professor.

†GALEN HOWELL CLEVINGER (Metallurgy), Research Professor.

HAYES WILSON YOUNG, WALDEMAR FENN DIETRICH (Metallurgy),
VALENTINE RICHARD GARFIAS (Petroleum Technology), Assistant
Professors.

Students intending to pursue their major subject in the Department of Geology and Mining should offer as a part of their entrance preparation solid geometry, trigonometry, advanced algebra, physics, and chemistry; otherwise the mathematics, physics, and chemistry must be taken in the University.

Courses of study in the Department of Geology and Mining lead to the degree of Bachelor of Arts on completing four years of study, or the equivalent of one hundred and eighty units of credit. The degree of Engineer is given in Mining or Metallurgy on completion of an additional year, or to the equivalent of forty-five additional units of credit, including a thesis. Or the degree of Master of Arts may be secured at the close of the fifth year's work, including a thesis, in accordance with the regulations of the University (Register p. 83). The degree of Doctor of Philosophy is given on completion of the required additional work under the conditions stated in the Register (p. 84). The requirement that the work shall be done in residence may in part be waived on recommendation of the department when the needs of original investigation cannot be met at the University.

COURSES OF STUDY

The following is a list of the studies offered in the department. They are grouped under the heads of Geology, Mineralogy, Economic Geology, Paleontology, Mining, and Metallurgy. Certain elementary courses in the department are required of all students, as indicated: Geography 1; Geology 1, 2, 3; Economic Geology 1, 2; Mineralogy 1; Paleontology 2, 3. Other courses are elective, except that no study may be taken without proper preparation, and should be selected only after conference with the instructors. At least sixty units of work in the department will be required for the degree of Bachelor of Arts of all students intending to follow the profession of geology and mining.

GEOLOGY

Geography 1: Physical Geography.—A lecture course on the aspects of the earth, treating of the facts, causes, and laws of physical geography; intended to give the student a knowledge of the physical world as the abode of man. Required of all majors in Geology and Mining; open to students from any other department.

4 units (for Geology majors), 3 units (for other majors), autumn quarter (WILLIS) TThS 8

† Absent on leave, autumn quarter, 1917-18.

Geology 1: Elementary Geology.—A lecture course on elementary geology, comprising a discussion of the phenomena and processes of geologic changes and an outline of geologic history. Designed to constitute an introduction to all other courses in the department, and required of all majors; open to students from any other department.

4 units, winter quarter (WILLIS) TThS 8; Lab. by arrangement

2. Field Excursions.—Elementary practice in geological observation as illustrated by the local facts of the geology within reach from the University. Required of Geology and Mining majors and open only to them, except by special arrangement.

2 units, autumn and spring quarters (WILLIS, TOLMAN)

S forenoons

3. Structural Geology.—Advanced work in the structure of stratified, massive, and foliated rocks. Open only to students who have had Geology 1 to 3 inclusive and Mineralogy 1.

2 units, winter quarter (WILLIS)

TTh 9

4. Field Geology.—Field practice in working out geology in the field and its representation upon topographic maps and sections. Prerequisites: Geology 1, 2, 3, 4, Mineralogy 1, and Civil Engineering 4a. Students not majoring in the department may omit Geology 3 and 4.

5 units, summer quarter (WILLIS)

5. Topographic Geology.—Field and laboratory work, with the construction of geologic maps and sections. Open to students who have completed course 4 in Geology.

5 units, summer quarter (TOLMAN)

6. Regional Geology.—Lectures and reading, with discussions in seminar, on the geologic provinces of North America and other continents. (WILLIS)

By arrangement

7. Advanced Geology.—Reading and research work for advanced students in Geology. (WILLIS)

By arrangement

MINERALOGY

Mineralogy 1: Common Minerals and Rocks.—The study of the more common minerals and prominent rock types. An elementary course with emphasis upon sight determination and simple physical and chemical properties. Introductory to the other courses in mineralogy and petrography. Open to students who have had Chemistry 1 and a. Required of all Geology and Mining students, and open to a limited number of other students in order of application.

4 units, autumn and spring quarters (ROGERS)

Lec. MW 10; Lab. MW 1:05-4:05

2. Crystallography.—An elementary study of the geometrical and optical properties of crystals and of the polarizing microscope as an instrument of research. This course is intended primarily as a prerequisite for course 3, but may also be taken independently by chemistry and physics students as an introduction to the study of the solid state.

4 units, winter quarter (ROGERS) Lec. WF 11; Lab. WF 1:05-4:05

3. Systematic Mineralogy.—Systematic study of the important minerals and their determination by all available methods. Mineralogy 1 and 2 (Crystallography) and Chemistry 6 and *b* are prerequisites.

4 units, spring quarter (ROGERS)

Lec. TTh 10; Lab. TTh 1:05-4:05

4. Petrography.—Study of hand specimens and thin sections of the principal rock types and mineral deposits. In course 3 the properties or characters of minerals are considered, while course 4 is primarily concerned with the relations between associated minerals with special reference to their occurrence and origin. Preparation and study of polished ore sections will be under the direction of Professor TOLMAN. Mineralogy 2 and 3 are prerequisites.

5 units, autumn quarter (ROGERS)

Lec. WF 11; Lab. WF and one period by arrangement, 1:05-4:05

5. Advanced Mineralogy.—Advanced work in crystallography, mineralogy, or petrography may be undertaken by properly prepared students.

2 to 5 units, winter quarter (ROGERS)

By appointment

ECONOMIC GEOLOGY

1. Non-metals.—The occurrence, distribution, origin, and geologic methods of investigation of the non-metallic substances. Prerequisite: Mineralogy 1.

4 units, winter quarter (TOLMAN)

MTThF 8

2. Ores.—The ore-forming processes, modes of occurrence of the various types of ore bodies, and the structures of the ores. The geologic study of the metallization of the important mineral-bearing provinces of the world and especially of the United States, and the description of the important ore deposits typical of each province. Open to students who have completed Mineralogy 1.

4 units, spring quarter (TOLMAN)

MTThF 8

3. Seminar in Ore Deposits.—A review of the literature of ore deposits and the bearing of the data collected upon the problems of

the physical properties of petroleum and its products, or other experimental investigations. Prerequisites: Mining 5 and 6. Students will register in M. E. 29.

2 to 5 units, any quarter (ECKART, GARFIAS) By arrangement

8. Mine Surveying and Geologic Mapping (surface and underground).—Taken in connection with Geology 5. (Topographic Geology.)

5 units, summer quarter (TOLMAN, FOLSOM)

9. Mining Practice.—Systematic study of general mining, milling, or smelting operations in the field in a representative mining district. This work will be under the direction of the department. Open only to graduates or advanced students.

15 units, summer quarter (FOLSOM, DIETRICH, YOUNG)

10. Mine Engineering.—Lectures and assigned reading on general engineering and economic problems in connection with mining operations. Open only to graduates or advanced students.

(a) Principles governing the valuation of mineral deposits.

(b) Engineering problems, the design of a mine plant.

3 to 6 units, autumn or winter quarters (FOLSOM, GARFIAS)

By arrangement

METALLURGY

LECTURE COURSES

Metallurgy 1: Metallurgy of Constructive Materials.—Lectures upon the manufacture and properties of iron and steel and, to a lesser extent, the other alloys used in engineering. Open to students who have completed Chemistry 1.

3 units, autumn quarter (DIETRICH)

MWF 8

2. Hydro-Metallurgy of Gold and Silver.—Lectures upon the general principles of hydro-metallurgical practice, with particular reference to the cyanide process. The older and now obsolete processes of chlorination, hyposulphite lixiviation, patio and pan amalgamation, etc., are referred to very briefly. Open to students who have completed Chemistry 1 and *a*. Prerequisite of Metallurgy *c*.

3 units, autumn quarter (YOUNG)

MWF 9

3. General Metallurgy.—Lectures upon the general principles of metallurgy, the fundamental chemical reactions, fuels, refractory materials, pyrometry, and alloys. The minor metals are dealt with briefly in this course. Open to students who have completed Chemistry 1 and *a*.

4 units, winter and summer quarters (YOUNG)

TWThF 10

4. Metallurgy of Lead.—Lectures upon lead smelting, refining of base bullion, the pyrometallurgy of gold and silver insofar as it is inseparable from that of lead, parting and electrolytic refining of Doré bullion. Open to students who have completed Chemistry 1 and *a*, and Metallurgy 3.

3 units, spring quarter (YOUNG) MWF 10

5. Metallurgy of Copper.—Lectures upon the smelting of copper ores, converting, electrolytic refining, and a brief discussion of the hydrometallurgy of copper. Open to students who have completed Chemistry 1 and *a*, and Metallurgy 3.

3 units, spring quarter (CLEVINGER) MWF 9

LABORATORY COURSES

a. Assaying.—The determination of gold, silver, and lead in ores and metallurgical products by fire assay. Open to students who have completed Chemistry 1 and *a*. Limited to sixteen students per quarter.

3 to 5 units, autumn and spring quarters (DIETRICH, YOUNG)
MTWThF 1:05-4:05

b. General Metallurgy.—Laboratory work on the standardization and use of various types of pyrometers, and the metallographic study of a limited number of metals and alloys.

3 units, winter quarter (YOUNG) WThF 1:05-4:05

c. Metallurgy of Gold and Silver.—This course involves the investigation and the making of a report upon the possible treatment of a gold or silver ore by the cyanide process. Open to students who have completed Chemistry *d* and Metallurgy 2 and *a*.

4 to 6 units, winter quarter (YOUNG) MTWThF 1:05-4:05


d. Flotation.—This course involves the investigation and the making of a report upon the possible treatment of an ore by flotation. Open to students who have completed Chemistry *d*, Metallurgy *a*, and Mining 2.

4 to 6 units, spring quarter (CLEVINGER, YOUNG)
MTWThF 1:05-4:05

e. Metallurgical Research.—Properly qualified students may take up any subject of metallurgical investigation in the laboratory and, under proper restrictions, certain investigations may be carried on in the field. Also work in bibliography.







3 to 10 units, all quarters (CLEVINGER) By arrangement









GERMANIC LANGUAGES



WILLIAM ALPHA COOPER, *GEORGE HEMPL, KARL GUSTAV RENDTORFF, 
Professors.



BRUNO BOEZINGER, CHARLOTTE A. KNOCH, Assistant Professors.








CHARLES REINING, Instructor.


In the following list of courses those of group I are designed: (1) to  furnish students whose major subject is German with the necessar  ary preparation for the courses of group II, (2) to prepare major student  ts of other departments of the University to read the technical literatur  e in German on their special subjects, and (3) to cultivate a taste fo  r German literature and provide a sufficient equipment for further rea  d- ing in that field, in later life.

First-year German continues through three quarters and prepar  es for second-year German, which, in turn, runs through three quart  ers and fits for third-year German. The work of third-year German co  m- bines a reading course of three units with a composition course of t  wo units, running through three quarters. Students who have comple  ted this normal amount of third-year German may take any course in group II for which, in the judgment of the instructor in charge, t  hey are prepared. All courses in group II (except 106, 131, 132, 133,  and 137) presuppose considerable facility in reading German and the abi  lity to understand lectures and answer questions in German.

Courses 61-63 afford personal, in place of the usual class, guida  nce and training. The same method of training is continued in course  51.

The Department accepts candidates for the degrees of A. B., A. *M.*, and Ph. D., in German, and for certification as high-school teachers of German in the State of California. Special consideration is given to the needs of those who intend to make the teaching of German thei  r profession, emphasis being put upon pedagogical training as well a  s upon scholarly attainment.

Candidates for the A. B. degree in German, who do not intend t  o teach German, are expected to take third-year German and six course  s (or fifteen units) selected from group II. They are advised to take  , in addition, some laboratory courses in science, some courses in Eng  - lish, history, and allied subjects, and in a foreign language other than  n German. This leaves to the free election of the student about one-half  of the number of units required for graduation, the proportion being  g

*Some of the courses offered by Professor Hempl are to be found in the an  n- nouncement of the Department of Latin.

even larger for those who present units of credit in German for entrance into the University.

Candidates for the high-school teachers' recommendation are expected to take, in addition to third-year German, courses 51, 52, 53, 63, three courses from the group 71-79, three from the group 81-89, courses 101 (or 102), 103, 104, 105, 106, 107, 109, 124, 125 (or 126 or 127), 131, and 137 (or 138). For those who are prepared to take third-year German in their freshman year these courses will amount to one-third of the number of units required for graduation from the University, with a somewhat larger proportion during the year after graduation. Candidates are advised to take courses in certain other departments, as stated in the preceding paragraph, and to begin early to prepare themselves in one or more minor subjects. Petitions for permission to substitute other courses for some of those included in this curriculum will be considered by the Department Faculty.

Candidates for the degree of A. M., in German, are expected to take the courses named in the foregoing paragraph, and to present a Master's thesis acceptable to the Department Faculty and the Committee on Graduate Study.

Candidates for the Ph. D. degree are referred to the bulletin on Graduate Study, 1917-1918.

The library facilities are good, and the collections are being rapidly strengthened in all directions. The private library of the late Professor Hildebrand, of the University of Leipzig, furnishes valuable material, particularly in the older literature and in lexicography. In modern literature the Library offers good opportunities for advanced work, the Goethe collection being especially satisfactory. The files and the current numbers of most of the important journals are at hand.

I. ELEMENTARY AND INTERMEDIATE COURSES

1. First-year German [See second paragraph of introductory statement, above, and the note below 3].—It is the object of this course to put the learner in possession of the elements of the German language. This implies: (1) a personal command of simple German, that is, the ability to understand such German, whether heard or read, and to employ the language in simple conversation, narration, and description, both orally and in writing; (2) such a ready familiarity with the elements of German grammar as is essential for the attainment of this command of the language.

5 units, autumn quarter (KNOCH, REINING) MTWThF 8, 9

2. First-year German, continued.

5 units, winter quarter (KNOCH, REINING) MTWThF 8, 9

3. First-year German, continued.

5 units, spring quarter (KNOCH, REINING) MTWThF 8,

[NOTE.—Courses 1, 2, and 3, together, are equivalent to two years of German in the high school, and may be taken by students who have presented no units credit in German for entrance into the University. Those who have had one year of German in the high school and present one unit for entrance may take courses 2 and 3. Those who present two units in German for entrance may take courses 1, 2, and 3 as a review, if they desire, but will receive no credit for the work.]

In 1917-18 and 1918-19 two sections of first-year German will be given as a part of the regular work of the Department Faculty, with no charge beyond a syllable fee of fifty cents per quarter. After October 1, 1919, first-year German will be given by competent instructors under the supervision of the Department Faculty and a fee of \$7.50 per quarter will be charged. University credit will still be granted for the work as at present.]

21. Second-year German [See second paragraph of introductory statement, above, and the note below 24].—The aim of this course is to extend and strengthen the student's personal command of German both oral and written. Three periods a week are devoted to the reading and discussion in German of texts selected from the writings of contemporary or late nineteenth century authors. In the other two periods of the week the text that is read furnishes the material for exercises in composition, practical grammar, and the study of words. By composition is meant, not translation from English, but practice in putting one's thoughts directly into written German. By practical grammar is meant employment in sentences of the more common forms and constructions under consideration, and explanation of the less common.

5 units, autumn quarter (BOEZINGER, KNOCH, REINING)

MTWThF 8, 9, 10

22. Second-year German, continued.

5 units, winter quarter (BOEZINGER, KNOCH, REINING)

MTWThF 8, 9, 10

23. Second-year German, continued.

5 units, spring quarter (BOEZINGER, KNOCH, REINING)

MTWThF 8, 9, 10

24. Second-year German, special course.

5 units, summer quarter (KNOCH)

MTWThF 8

[NOTE.—Courses 21, 22, and 23, together, are the equivalent of the third and fourth years of German in the high school. Prerequisites: Courses 1, 2, and 3, or two entrance units in German. Students who present three units in German for entrance should take courses 22 and 23, or 23 and 24. Course 24, which is given only in the summer quarter, is specially designed for students presenting three entrance units in German, and the texts read are not the same as those in 22 or 23.]

25. Scientific German [See note below 27].

3 units, autumn quarter (BOEZINGER)

MWF 8

- 26. Scientific German, continued.**
3 units, winter quarter (BOEZINGER) MWF 8
- 27. Scientific German, continued.**
3 units, spring quarter (BOEZINGER) MWF 8
- [NOTE.—Courses 25, 26, and 27 form one continuous course, but final credit for the work of any quarter is granted when the work is completed. Prerequisites for 25: Courses 1, 2, and 3, or two entrance units in German. Scientific German should not be taken before the sophomore year.]
- 31. Third-year Reading, Drama** [See second paragraph of introductory statement, above, and note below 37].—The dramas read are selected from the classical period. An occasional hour is devoted to lyrics and ballads from the same period.
3 units, autumn quarter (KNOCH) MWF 10
- 32. Third-year Reading, Drama, continued.**—The dramas read are chosen from the period between 1805 and 1888. Selected lyrics and ballads from the same period are read at intervals.
3 units, winter quarter (KNOCH) MWF 10
- 33. Third-year Reading, Drama, continued.**—The dramas read are taken from the period since 1888. Lyrics from the same period are read from time to time.
3 units, spring quarter (KNOCH) MWF 10
- 34. Third-year Reading, Novel** [See second paragraph of introductory statement, above, and note below 37].—The novels read are from the period since 1800, such works being selected as portray the character, life, and institutions of the German in the past and present. Lyrics and ballads are read now and then throughout this and the following two courses.
3 units, autumn quarter (BOEZINGER) MWF 11
- 35. Third-year Reading, Novel, continued.**
3 units, winter quarter (BOEZINGER) MWF 11
- 36. Third-year Reading, Novel, continued.**
3 units, spring quarter (BOEZINGER) MWF 11
- 37. Third-year Reading, special course.** Dramas, novels, and lyrics and ballads are read.
3 units, summer quarter (KNOCH) MWF 9

[NOTE.—Any three of the courses 31 to 37 will fulfil the minimum requirement in reading for admission to the courses numbered from 61 on. The works read in class, together with those read outside, give an introduction to the modern German drama, or novel, as the case may be, and prepare inquiring students for further independent reading in these fields. The method employed in conducting

these courses is designed to help the students reach the point where they can read modern literary German without drudgery, understanding it quickly and without translation. To this end the amount assigned for a lesson is gradually but steadily increased from the beginning to the end of the quarter. The recitations are conducted in German. If, in individual cases, the desired facility should not be attained at the end of three of these courses, it would be advisable to make further elections from the group before undertaking the advanced literary courses.]

38. Third-year Composition.—By composition is meant, not translation from English, but the employment in connected prose of German material either gathered from reading or specially assigned by the instructor.

2 units, autumn quarter (REINING) TTh 10

39. Third-year Composition, continued.

2 units, winter quarter (REINING) TTh 10

40. Third-year Composition, continued.

2 units, spring quarter (REINING) TTh 10

II. ADVANCED AND GRADUATE COURSES

51. Advanced Composition.—The aim of this course is to develop correct, idiomatic, and adequate expression.

2 units, autumn quarter (BOEZINGER) TTh 8

52. Advanced Composition, continued.

2 units, winter quarter (BOEZINGER) TTh 8

53. Advanced Composition, continued.

2 units, spring quarter (BOEZINGER) TTh 8

The following three courses provide individual instruction and guidance to meet special needs and desires:

61. Directed Reading.—Prerequisites: Three courses in third-year reading, and evidence of a serious purpose.

1 or 2 units, any quarter (COOPER, RENDTORFF) To be arranged

62. Individual Composition.—The purpose of this course is to supplement the work of the other composition courses, and to afford an opportunity to continue practice in composition, under criticism, as long as the student remains at the University. In the summer quarter those taking the course will meet regularly as a class.

1 unit, autumn, winter, and spring quarters (RENDTORFF)

To be arranged

2 units, summer quarter (RENDTORFF)

TTh 8

63. Undergraduate Thesis.—Individual training in the aim and method of research: collecting material, interpreting it, and putting the

results in clear form. This course is designed to cultivate the habit of finding things out for one's self, instead of merely seeking authorities to quote.

1 or 2 units, any quarter (COOPER, RENDTORFF) To be arranged
The following nine courses take up individual authors and study their lives, works, and times:

71. Lessing and his Time.

3 units, spring quarter (RENDTORFF) TTh 8

72. Herder and the Storm and Stress.

3 units [Not given in 1917-18.]

73. Goethe, his Life and Works up to 1775 [See note below 77].

4 units, autumn quarter (COOPER) [Not given in 1917-18.]

74. Goethe, his Life and Works after 1775 [See note below 77].

4 units, winter quarter (COOPER) [Not given in 1917-18.]

75. Goethe's Lyrics and Ballads.

3 units, summer quarter (COOPER) [Not given in 1917-18.]

76. Goethe's Faust: Urfaust, Fragment of 1790, and Part First.

4 units, autumn quarter (COOPER) TWThF 10

77. Goethe's Faust: Part Second.

4 units, winter quarter (COOPER) TWThF 10

[NOTE.—Courses 73 and 74 are given alternate years with 76 and 77.]

78. Schiller's Lyrics and Ballads.

3 units, autumn quarter (RENDTORFF) TTh 8

79. Schiller's Dramas.

3 units, winter quarter (RENDTORFF) TTh 8

The following nine courses deal with the literary history of Germany:

81. History of German Literature up to the Nineteenth Century.

4 units (RENDTORFF) [Not given in 1917-18.]

82. History of the Nineteenth Century Literature.

3 units, autumn quarter (RENDTORFF) MWF 8

83. The Romantic School.

3 units [Not given in 1917-18.]

84. The Period of Realism.

3 units [Not given in 1917-18.]

85. Current Literary Movements.

3 units, winter and summer quarters (RENDTORFF) MWF 8

86. The Development of the Drama.

3 units [Not given in 1917-18.]

87. The Development of the Növel.

3 units

[Not given in 1917-18.]

88. The Development of Lyrical Poetry.

3 units, spring quarter (COOPER)

MWF 10

89. Introduction to Literary Criticism.

3 units

[Not given in 1917-18.]

[The following nine courses are intended especially for prospective teachers of German:]

101. Conversation.—Discussions of topics on modern Germany.

2 units, spring quarter (KNOCH)

Th 2:05-4 :05

102. Conversation.—Discussions of German writers commonly read in high schools.

2 units, summer quarter (KNOCH)

Th 2:05-4 :05

103. German Orthography and Phonology [See note below 105].

2 units, autumn quarter (HEMPL)

TTh 1 :05

104. German Morphology [See note below 105].

2 units, winter quarter (HEMPL)

TTh 1 :05

105. German Syntax.

3 units, spring quarter (COOPER)

MWF 9

[NOTE.—Courses 103 and 104 present systematically the more important facts of German grammar, together with individual investigations of the usage of various writers. Course 105 is mainly an inductive study of syntax, with occasional lectures on historical developments, and is conducted in German.]

106. Modern Language Teaching.—Lectures on the various methods of teaching modern foreign languages, and the psychology involved.

1 unit, autumn quarter (HEMPL)

W 1 :05

107. German Teachers' Course.—For candidates for the high school teachers' recommendation. Students taking this course are trained to conduct classes in accordance with modern progressive methods, partly by lectures, but chiefly by practice under close supervision. A part of the work of the course consists in becoming acquainted with the various types of textbooks available, and with the materials specially prepared for use in "Anschauungsunterricht." Course 106 should be taken at the same time as this course.

4 units, autumn quarter (COOPER)

MF 2:05-4 :05

[NOTE.—Students taking course 107 have access to the Department's special collection of high-school German textbooks, published in America, and a model reference library for a high-school teacher of German, as well as an extensive collection of maps and pictures designed for use in teaching.]

1. **German Teachers' Course.**—For teachers of some experience. Discussion and demonstration of ways and means of teaching elementary and intermediate German with the greatest effectiveness, and lectures on the teaching of German literature.

4 units, summer quarter (KNOCH, RENDTORFF) MTWF 10

2. **Practice Teaching.**—A limited number of Major students who have made satisfactory records in courses 106 and 107 may arrange for practice in teaching in connection with the classes in first-year and second-year German. After permission has been obtained the course could be registered for in the Education Department under the appropriate number and title.

5 units, autumn and winter quarters (COOPER, KNOCH)
To be arranged

3. **Gothic** [See note below 123].

2 units

4. **Old Norse** [See note below 123].

2 units

5. **Old High German.**

2 units

RE.—Courses 121, 122, and 123 will be given whenever there is sufficient demand for them, provided requests have been sent to the Department long enough in advance to make the necessary arrangements.]

6. **Middle High German.**—Grammar and selected texts.

2 units, autumn quarter (RENDTORFF) MW 9

7. **The National Epic.**—A continuation of course 124.

2 units, winter quarter (RENDTORFF) MW 9

8. **The Court Epic.**—A continuation of course 125.

2 units (RENDTORFF) [Not given in 1917-18.]

9. **Minnesong.**—A continuation of courses 124 and 125.

2 units, spring quarter (RENDTORFF) MW 8

10. **Phonetics.**—Lectures and drill in general phonetics, for students of ancient or modern languages, including English.

3 units, summer quarter (HEMPL) MWF 1:05

11. **The Genesis of Grammar.**

2 units (HEMPL) [Not given in 1917-18.]

12. **The Genesis of Writing.**

2 units (HEMPL) [Not given in 1917-18.]

134. **The Runes.**—Lectures on the origin and development of primitive Germanic writing.
2 units (HEMPL) [Not given in 1917-18.]
135. **Introduction to Germanic Philology.**
2 units (HEMPL) [Not given in 1917-18.]
136. **The History of the German Language.**
3 units [Not given in 1917-18.]
137. **The History of German Civilization.**—Lectures with stereopticon, on the development of German civilization in its relation to German literature.
4 units, spring quarter (RENDTORFF) MW 2:05-4 :05
138. **Modern Germany.**—Lectures in German, with stereopticon.
4 units, summer quarter (RENDTORFF) MTThF 9
141. **Proseminary.**—Classical Literature.
3 units, winter quarter (COOPER) M 2:05-4 :05
142. **Proseminary.**—Nineteenth Century literature.
3 units [Not given in 1917-18.]
143. **Proseminary.**—Philology.
3 units [Not given in 1917-18.]
144. **Seminary.**
3 units [Not given in 1917-18.]
151. **Master's Thesis.**—The candidate reports weekly to the instructor in charge for criticism, the work extending over three quarters, as a rule.
1 to 3 units, any quarter (COOPER, RENDTORFF) To be arranged

GREEK

AUGUSTUS TABER MURRAY, Professor.

ERNEST WHITNEY MARTIN, Associate Professor.

The Department accepts as major students those who wish to make their work in college conform to the traditional Arts course, in which Classical studies form an important element, and also makes provision for the thorough training of those who look forward to post-graduate work in the Classics either in this university or elsewhere.

Students who have had no Greek before entering the university may begin their study of the language in any quarter in introductory classes.

which are open to students in all departments of the university. Students who offer Greek on entrance will be registered in classes adapted to their needs.

The major requirements for graduation amount normally to forty-five credit units. These, for the most part, naturally represent work in the study of the Greek language, especially in the case of students looking forward to post-graduate work in the Classics, but after the completion of courses 1-6 students desiring to do so may substitute for further work in the language the more general courses offered in the Department, and with the consent of the departmental adviser a part of this elective work, when the tastes or special aims of the individual student justify it, may be taken in allied departments.

Together with the classes in the Greek language the Department offers courses in Greek Literature, Greek Art, Greek History, and New Testament Literature, which, as above indicated, may be taken as a part of the required work of major students in Greek, but which presuppose no knowledge of the Greek language, and are open to students in all departments of the university.

The minimum requirement for the High School teacher's certificate includes courses 1-6, the teacher's course, and two at least of the general courses offered in the Department.

In courses 1-3 the work is arranged so as to provide as far as possible individual instruction adapted to the needs of each student. In courses 4-6 the intensive study of a limited portion of the authors read is supplemented by sight translation and by readings and lectures by the instructor.

UNDERGRADUATE COURSES

• **Introduction to Greek.**—Grammar (Goodwin); learning of words; writing of simple sentences; reading of portions of the Gospel of John (White).

5 units, any quarter (autumn, spring, summer, MARTIN; winter, MURRAY) MTWThF 1:05

• **Xenophon.**—Review of Greek Grammar (Goodwin); learning of word-lists from Xenophon; reading of selections from the Anabasis (Murray); writing of exercises based upon the text read.

4 units, autumn, winter, and spring quarters (autumn, spring, MURRAY; winter, MARTIN) MTThF 1:05

• **Attic Prose Writers.**—Systematic review of Greek syntax (Goodwin); learning of word-lists from the texts read; reading of portions of Cebes' Tablet (Parsons); Plato's Apology (Dyer-Seymour).

4 units, autumn, winter, and spring quarters (autumn, spring, MARTIN; winter, MURRAY) MTWF 8

4. Introduction to Homer.—Study of Homeric forms and meter (Seymour); learning of Homeric word-lists (Owen and Goodspeed); reading of selections from the Iliad (Monro).

4 units, autumn and spring quarters (MURRAY) MWThF 9

5. The Greek Historians.—Selections from Herodotus (Smith); Thucydides, Book I (Morris); study of The Greek Historians (Bury).

4 units, winter quarter (MARTIN) MTThF 10

6. Introduction to Greek Poetry.—Reading of Euripides' Alcestis (Earle); the Greek Lyric Poets (Tyler); the Greek Anthology (Stadtmüller); Short History of Greek Literature (Wright).

4 units, spring quarter (MARTIN) MTThF 10

7. Euripides.—Reading of Medea (Moore); Hippolytus (Harry); lectures and a study of these dramatic themes as treated by later poets.

3 units, autumn quarter (MURRAY) [Not given in 1917-18.]

8. Sophocles.—Reading of Antigone (Dodge); Electra (Mather); lectures on the art of Sophocles. [Not given in 1917-18.]

3 units, winter quarter (MURRAY) MWF 11

9. Aeschylus.—Reading of Prometheus Bound (Allen-Wecklein); Agamemnon (Cidgwick); lectures. [Not given in 1917-18.]

3 units, spring quarter (MURRAY) MWF 11

10. Plato.—Reading of the Republic, Books I and II (Wells); reading of the remaining books in Jowett's translation; lectures.

3 units, autumn quarter (MURRAY) MWF 11

11. Demosthenes.—Reading of the De Corona (Tyler); sight translation of Aeschines Against Ctesiphon (Richardson).

3 units, winter quarter (MURRAY) MWF 11

12. Pindar and Theocritus.—Reading of selected Odes of Pindar (Gildersleeve); reading of Theocritus (Cholmeley); lectures on Pastoral poetry in ancient and modern literatures.

3 units, spring quarter (MURRAY) MWF 11

SUPPLEMENTARY COURSES

13. Individual Work.—Students and instructors meet each week for work suited to the needs of the individual.

1 to 4 units, each quarter (MURRAY, MARTIN, ———)

By arrangement

14. Journal Club.—Instructors and advanced students meet each week for the discussion of journals and new books of interest to Classical students.

2 units, each quarter (MARTIN)

W 2-4

15. **Thesis Course.**—Advanced students may under the guidance of the instructor undertake special studies for presentation in thesis form. This course is intended primarily to afford training in the methods of investigation.

2 units, each quarter (MURRAY, MARTIN) By arrangement

5. **Modern Greek.**—Grammar (Rangabe); reading of easy texts.

2 units, winter and spring quarters (MARTIN) F 2-4

7. **Teachers' Course.**—Lectures on methods, with practical training.

2 units, spring quarter (MURRAY) S 9

GENERAL COURSES

3. **The Greek Epic.**—Lectures on Homeric Poetry, with reading of the Iliad and Odyssey in English (Iliad, Lang, Leaf, and Myers; Odyssey, Butcher and Lang).

3 units, autumn quarter (MURRAY) MWF 10

5. **Greek Tragedy.**—Lectures on the art of tragedy among the Greeks with the study of selected plays in translation (Aeschylus, Elphinstone; Sophocles, Jebb; Euripides, Everyman's Library).

3 units, winter quarter (MURRAY) MWF 10

6. **New Testament Literature.**—Lectures on the origin, authorship, and characteristics of the books of the New Testament. Peake's Critical Introduction is used as a handbook.

3 units, spring quarter (MURRAY) MWF 10

1. **Greek Literature, Prose Writers.**—Lectures; reading in translations of selections from Herodotus, Thucydides, Xenophon, Plato, Demosthenes, Plutarch, and Lucian. Textbook, Short History of Greek Literature (Wright).

3 units, autumn quarter (MARTIN) MWF 11

2. **Greek Literature, Poets.**—Lectures; reading in translations of selections from the greater Greek Poets with some reference to their influence on later literature. Textbook, Homer to Theocritus (Capps).

3 units, winter quarter (MARTIN) MWF 11

3. **Greek Myths.**—The more important myths and legendary characters of early Greece are traced through Greek Literature with some reference to their treatment in later literature. Lectures with assigned reading. Open only to students who have had Greek.

3 units, spring quarter (MARTIN) MWF 11

24. Greek History A.—From earliest times down to the end of the Peloponnesian War. Open to all students.

3 units, autumn quarter (MARTIN) TThS 9

25. Greek History B.—From the Spartan Supremacy to the Roman Conquest. Open to all students.

3 units, winter quarter (MARTIN) TThS 9

26. Greek Sculpture.—Lectures, illustrated with photographs and lantern slides, on the history and character of Greek sculpture.

3 units, winter quarter (FAIRCLOUGH) MWF 8

GRADUATE COURSES

27. The Greek Seminary.—Graduate students and such others as may satisfy the director of their fitness for the work will meet each week during the year 1917-18 for the critical study of Plato's *Republic*.

2 to 4 units, autumn, winter, and spring quarters (MURRAY)

S 10-12

Graduate students will also find it well to take courses 14, 15, and 17.

HISTORY

EPHRAIM DOUGLASS ADAMS, ARLEY BARTLOW SHOW, EDWARD KREHBIEL, PAYSON JACKSON TREAT, Professors.

HENRY LEWIN CANNON, Associate Professor.

EDGAR EUGENE ROBINSON, PERCY ALVIN MARTIN, YAMATO ICHIHASHI, Assistant Professors.

The Department of History provides a liberal course for the A. B. degree, offers opportunity for graduate study leading to higher degrees in certain selected fields in which the University is especially well equipped, trains teachers of History, and renders a general service to the other Departments of the University.

In addition to its more specialized work, the Department offers a number of courses (grouped as (I) Introductory and (II) Advanced Lecture Courses) intended to meet the general needs of the University constituency. The underlying principle of these courses is that they shall be useful, not in the utilitarian sense, but in the sense that they aid to equip the student for his duties as a citizen and give him instruction that may be helpful in such lines as Law, Journalism, Library research work, State and National Public Service, or in business where a knowledge of domestic and foreign affairs is desirable.

For History majors the course for the degree of A. B. is designed to familiarize the student with the fundamentals and methods of the

chief branches of knowledge, and with the methods of historical science. With this object in view, a general system of advice and requirement has been outlined, but it may be varied to suit the circumstances of the truly exceptional student. Under the four quarter system 180 units are required for graduation. The general system of the History Department prescribes 45 units of History, of which 5 are required in History Training, 3 in an Introductory Seminar, and 6 in a Seminar Course. Additional requirements in other Departments are, approximately, in Economics or Political Science 20 units, in English 10 units, a laboratory course in Science, and a reading knowledge of at least one foreign language by the end of the junior year. The course in History of Civilization will not be counted as part of the required units for History majors.

ADVANCED DEGREES.—Graduate students, candidates for advanced degrees, are desired and will be given personal guidance, but the purposeless graduate student will not be accepted by the Department. For the opportunities of graduate study in History see University Bulletin on Graduate Study.

Graduate students seeking to fulfill the requirements of the State Board of Education for the Teacher's Certificate will be given the necessary aid and opportunities, but will register as majors in the School of Education. (See University Bulletin of School of Education.)

THE TEACHER'S RECOMMENDATION IN HISTORY.—Whether History majors or not, applicants for the Departmental recommendation must have completed in a manner acceptable to the Department at least 40 units of History, as follows: (1) Seminar Courses aggregating at least 6 units; (2) the Teacher's Course in History (History 100 and 01), 6 units; (3) 28 units in the group of Introductory Courses selected from the following fields: Mediaeval and Modern History Courses 10-14 inclusive; English History (Courses 16 and 17); American History (Courses 21-24 inclusive). History majors may substitute for any two of the Introductory Courses 10 units of Ancient History as offered by the Departments of Greek and Latin.

Students taking History as a major with the intention of preparing for Journalism are referred to the heading Journalism on page 71.

I. INTRODUCTORY COURSES

History of Greece.—See Greek 24 and 25.]

History of Rome.—See Latin 29.]

[Seminar in Roman History.—See Latin 30.]

[History of Roman Civilization.—See Latin 37.]

1. Historical Training Course.—A practical course in the finding and handling of historical material. Required of, and limited to, first-year History majors.

5 units, spring quarter (MARTIN)

MTWThF 8

2. History of Civilization to 1500.—A survey of the history of civilization, sketching the development of the political, religious, economic, social, and cultural institutions of mankind from the earliest times. Beginning with a discussion of the nature and functions of history, the course surveys the period of antiquity, the civilization of Greece, Rome, and of Christian, Mohammedan, and Oriental peoples down to 1500. Open to all students except first-year History majors. Does not count toward the forty-five units in History required of History majors.

5 units, autumn quarter (KREHBIEL, TREAT, ICHIHASHI, MURRAY, FAIRCLOUGH, SHOW, CANNON)

MTWThF 8

3. History of Civilization, 1500-1815.—A continuation of History 2. After surveying the Era of Religious Wars and the Monarchial Age, the course sketches the colonial, commercial, and cultural expansion of Europe, giving especial attention to colonies in America, and to the impact of Western Civilization on the Far East. This is followed by lectures on the origins and development of democratic institutions, on the Revolutionary and Napoleonic Eras, and on the beginnings of the United States. Open to all students except first-year History majors. Does not count toward the forty-five units in History required of History majors.

5 units, winter quarter (KREHBIEL, CANNON, ADAMS, ROBINSON, MARTIN, TREAT)

MTWThF

4. History of Civilization Since 1815.—Continuation of History 3. The industrial revolution and its political and social consequences, the role of applied science, the triumph of liberalism, the emergence of class consciousness, national revivals and policies, imperialism, and lectures on important domestic or foreign problems of the several nations in modern times. Open to all students except first-year History majors. Does not count toward the forty-five units in History required of History majors.

5 units, spring quarter (ADAMS, ROBINSON, KREHBIEL, CANNON, TREAT, ICHIHASHI, MARTIN)

MTWThF

10. European History, 395-1300.—A general course on the Middle Ages, dealing with selected phases of the period, and with special emphasis on economic and social progress. Open to all students.

5 units, autumn quarter (SHOW)

MTWThF

11. European History, 1300-1648.—A continuation of History 10, with special emphasis on the Renaissance and the Reformation, and covering the broader movements of the later period up to the Peace of Westphalia. Open to all students.

5 units, winter quarter (SHOW) MTWThF 10

12. Europe since 1648.—The period of absolutism and dynastic rivalries, and the origins and development of democracy and nationalism. Open to all students.

5 units, spring quarter (KREHBIEL) MTWThF 9

13. European History, 395-1300.—A repetition of History 10 as given above, but divided into two periods from 395 to 1095, and from 1095 to 1300. Either term may be taken independently.

5 units, summer quarter (SHOW) MTWThF 10

14. Europe since 1648.—A repetition of History 12 as given above, but divided into two terms, the first covering the period from 1648 to 1789, the second from 1789 to date. Either term may be taken independently.

5 units, summer quarter (KREHBIEL) MTWThF 9

16. English History to 1485.—A general outline course especially intended for first year students; lectures and outside reading. Emphasis is placed upon events and institutions which have influenced American History. Open to all students.

4 units, autumn quarter (CANNON) MTWF 11

17. English History from 1485 to the present time.—A continuation of History 16.

4 units, winter quarter (CANNON) MTWThF 11

21. American History, 1607-1789.—A survey of the English Colonization of the Atlantic Seaboard and of the westward movement of colonists of the British Empire, followed by a consideration of the Revolution and of the formation of the American government. Open to all students.

5 units, spring quarter (ROBINSON) MTWThF 10

22. American History, 1789 to 1848.—Presidential administrations from Washington to Polk: the War of 1812; industrial changes and expansion; abolition; political changes; and territorial expansion. Open to all except freshmen students.

5 units, autumn quarter (ADAMS) MTWThF 2:05

23. American History, 1848-1915.—Slavery issues; the Civil War; reconstruction; industrial changes; new political parties and theories;

the United States and world politics. Open to all except freshmen students.

5 units, winter quarter (ADAMS) MTWThF 2:05

24. American History, 1789-1840.—A course especially designed for the summer quarter, offering a survey of the political and institutional history of the United States from the inauguration of Washington to the close of the Jacksonian period. First six weeks to 1815. Second six weeks to 1840. Either term may be taken independently.

5 units, summer quarter (ROBINSON) MTWThF 8

27. The Far East.—An account of the relations between Western nations and the peoples of Eastern Asia. Emphasis is placed upon international relations, especially since the middle of the 19th century, rather than upon the domestic history of the Eastern nations. The work of the Portuguese, Dutch, and British is studied and special attention is given to the rise of the British Empire in India. Open to all except freshmen students.

5 units, autumn quarter (TREAT) MTWThF 9

28. The Far East.—The relations of the West with China, Indo-China, Japan, and the Philippines. Open to all except freshmen students.

5 units, winter quarter (TREAT) MTWThF 9

31. History of Japan to 1600.—A survey of, and an attempt to interpret, the history of ancient and mediaeval civilization of Japan. Particular attention is paid to the origin of the Japanese race, early influence of the continental civilizations, the Great Reform of 645, the Taiho Code of 701, the position of Buddhism and Buddhists in Nara civilization, Japanese language, Heian or classical culture of Japan, the rise of feudalism, the feudal institutions of Kamakura, the Mongol invasions, Japan's foreign relations, the religions: Shintoism, Buddhism and Christianity, and Hideyoshi's colossal ambitions. Open to all except freshmen students.

4 units, autumn quarter (ICHIHASHI) MTWF 11

32. History of Early Modern Japan, 1600-1854.—A detailed examination of feudal Japan under the Tokugawa in order to obtain the underlying factors in Japanese life. Special attention is given to the political and social structure of the country, to Tokugawa laws and legal institutions, Japan's foreign and domestic commerce and commercial institutions, industrial development and industrial arts, fine arts, education, philosophy, science and literature, and Bushido. Open to all except freshmen students.

4 units, winter quarter (ICHIHASHI) MTWF 11

36. History of Spanish America.—An outline course dealing chiefly with the Spanish Colonial System and the Spanish-American Wars of Independence. Open to all except freshmen students.

5 units, autumn quarter (MARTIN) MTWThF 10

37. History of South America since 1823.—A continuation of History 36. An outline course dealing with the history and institutions of the leading nations of South America; includes the discussion of such topics as the Monroe Doctrine, Pan-Americanism, and the relations between the United States and Latin America.

5 units, winter quarter (MARTIN) MTWThF 10

38. History of Latin America.—A general outline course dealing with the colonial expansion of Spain and Portugal in America and with the political, social, and industrial development of the leading republics of Latin America. The first six weeks will deal with the Spanish Colonial System and the Spanish American Wars of Independence; the last six weeks will include a summary account of historical evolution of the leading republics of Latin America from 1823 to the present time. Considerable emphasis will be placed upon the diplomatic relations between the United States and Latin America. Either section of the course may be taken separately.

4 units, summer quarter (MARTIN) MTWF 11

II. ADVANCED LECTURE COURSES

The courses in this group are intended for students of at least junior standing, but sophomores may be admitted at the discretion of the instructor.

50. The Italian Renaissance.—General lectures on the learning, art, and culture of the Renaissance in the fourteenth and fifteenth centuries.

3 units, spring quarter (SHOW) MWF 9

51. Europe since 1815.—A course of lectures on the conflict of Reaction and Liberalism, the Industrial Revolution, the emergence of class consciousness, nationalism, and imperialism.

3 units, autumn quarter (KREHBIEL) MWF 9

52. Europe Since 1815.—A repetition for the summer quarter of History 51, as above, but so divided as to permit two separate terms of six weeks each.

3 units, summer quarter (KREHBIEL) MWF 11

53. World Politics.—This is a course of lectures on the relations of nation to nation and on the desirability, possibility, and means of im-

proving them. Among the topics discussed are: nationalism; national ambitions, missions, and cultures; expansion, imperialism, alliances, and the balance of power; competitive armaments and their economic, social, and political consequences; the function of force in human progress; super-national forces and movements tending to create an international law; the Hague Conferences, and Tribunal; and the various proposals for securing peace, such as disarmament, preparedness, The League to Enforce Peace, The Union of Democratic Control, education, etc.

2 units, spring quarter (KREHBIEL) TTh 10

.56. English History During the Tudor and Stuart Periods.—Conducted by means of oral reports and informal discussions in class. Open to a limited number of students.

4 units, winter quarter (CANNON) MTWF 9

60. The Westward Movement (1790-1890).—A survey of the expansion of the American people into the Mississippi valley, the American occupation of the Pacific Northwest and of California and the growth and development of the trans-Mississippi region. Particular emphasis is placed upon the history of the Far West in the period since 1850, and its influence upon national and international affairs.

3 units, autumn quarter (ROBINSON) MWF 10

62. History of the West.—A consideration of the political phases of the expansion of the American people; a presentation of the programmes of the Federalist, Republican, Democratic, Whig, Populist, and Progressive parties relating to the West, and of the proposals and influence of such western leaders as Jackson, Benton, Lincoln and others of more recent date; an examination of new issues and new groups that have arisen in the West and their influence upon national party history.

3 units, winter quarter (ROBINSON) MWF 10

64. British-American Diplomatic Relations.—Lectures and reading on those incidents or conditions in foreign policy where the United States has come into conflict or contact with the foreign policy of Great Britain and her colonies; with a survey of the general purpose of British, and of American foreign policy, throughout the hundred year period.

3 units, spring quarter (ADAMS) MWF 11

66. History of Australasia.—An account of British colonization in Australia and New Zealand to the present time. Open to third-year students who have a satisfactory knowledge of English history.

3 units, spring quarter (TREAT) MWF 9

68. Modern Japan Since 1854.—A critical study of political and economic Japan since 1854 in order to determine the causes that enabled the nation to attain her present position in the world of politics and economics. Special attention is paid to political movements since the re-opening of Japan to Western intercourse, and to the promulgation of a constitution in 1889, or the struggle between feudalism or bureaucracy and liberalism or democracy.

3 units, spring quarter (ICHIHASHI)

MWF 9

70. History of Mexico and California.—A somewhat detailed study of the History of Mexico up to the present time, and of the history of California to 1848.

3 units, spring quarter (MARTIN)

[Not given in 1917-18.]

72. Latin American Institutions.—This course will deal with the recent history and present day political institutions of the leading republics of Latin America. Considerable attention will also be paid to contemporary economic and social problems, and commercial relations with the United States. The first six weeks will be devoted chiefly to Argentina and Chile; the last six weeks to Brazil and the remaining Latin American republics. Either section of the course may be taken separately.

3 units, summer quarter (MARTIN)

MWF 9

[Law 10. International Law.—A course given by the Law Department, strongly advised for History majors interested in world politics and relations. It will be accepted for credit in fulfilling the History requirements for the A. B. degree. Open, at the discretion of the instructor, to majors of other than the Law Department in their third or fourth year.

4 units, spring quarter (LARREMORE)]

III. INTRODUCTORY SEMINAR COURSES

The courses in this group are intended primarily for History majors in their junior year, as preparation for senior seminars or graduate work. If a course is not filled by History majors, others may be admitted at the discretion of the instructor.

76. German Constitutional History.—An intensive study from the documents of selected phases of German constitutional development. A reading knowledge of German is desirable. Open to juniors, seniors, and graduates.

3 units, spring quarter (SHOW)

MWF 10

78. Nineteenth Century European Problems.—Papers and class discussions on important domestic and foreign problems of European

nations. Open to History majors with two years' credit and to all students who have had History 51 or 52.

3 units, winter quarter (KREHBIEL) MWF

80. English Constitutional History.—The course attempts to explain the development and operation of the present English constitution as well as to give the background for American constitutional history. Conducted by means of an intensive study of documents, with outside reading.

5 units, spring quarter (CANNON) MTWThF

86. Relations Between California and the Federal Government.—An examination of materials revealing the problems of California and their relation to national development. The period 1869-1879 will be studied with emphasis upon problems arising out of the completion of the Pacific railway and the place of California in the national period of Reconstruction.

3 units, spring quarter (ROBINSON) M 2

88. American Diplomatic Relations.—Not a general survey of the field, but a specialized study of selected topics, with use of the available documentary material. Intended primarily for History majors but open to junior students who are familiar with the elements of American and European History.

3 units, autumn quarter (ADAMS) MWF

90. Tropical Colonization in the Far East.—A study of the present methods of the English, Dutch, French, and American governments in their tropical dependencies in the Far East. Investigation, discussion, and reports. Open to students who have taken courses 27 and 28.

3 units, autumn quarter (TREAT) MWF

92. Governments of the Far East.—A study of the present governmental systems of China and Japan. Open to students who have taken course 28.

3 units, autumn quarter (TREAT) [Not given in 1917-18]

96. History of Brazil.—A somewhat detailed study of the History of Brazil with special emphasis on the period since 1822. The course will include a comparison of Brazilian political institutions with those of Spanish America and the United States. Open to those who have had History 37 and to others with permission of the instructor.

3 units, spring quarter (MARTIN) MWF

IV. SEMINAR COURSES

[For History majors primarily, of senior or graduate standing.]

100. The Principles of History Teaching.—Lectures and class discussions dealing with the problem of teaching History and related subjects in the schools. This course is required for the Teacher's Recommendation but does not count in the required 6 units of Seminar work [For History majors primarily, of senior or graduate standing.]

3 units, autumn quarter (SHOW) MWF 1:05

101. The Methods of History Teaching.—Class-room practice in the teaching of History, Civics, and Economics. This course is required for the Teacher's Recommendation, but does not count in the required 6 units of seminar work for History majors. Open to students who have had History 100 or a satisfactory equivalent.

3 units, winter quarter (SHOW) MWF 1:05

102. The Principles and Methods of History Teaching.—The summer quarter course is divided into two terms of about six weeks each, as follows:

First term: The Principles of History Teaching. Lectures and discussions on such problems as the aims of History teaching, the apparatus of History teaching, courses of study, text-books, class-room methods, etc.

Second term: The Methods of History Teaching. Class-room practice in the teaching of History and related subjects, with collateral discussions and criticisms. Students who are qualified may take either term without the other. This course is required for the Teacher's Recommendation but does not count in the required six units of seminar work for History majors.

3 units, summer quarter (SHOW) MWF 2:05

105. Seminar in Mediaeval History.—The study of selected phases of mediaeval history from the documents. Subject for 1917-18: "German Colonization in the Middle Ages." Ability to read Latin and German is required.

3 units, spring quarter (SHOW) W 2-4

107. Seminar in Modern European History.—Subject 1917-18: International Joint-Action; a study of the attempts of several nations jointly to control or administer matters of international concern. Open to senior and graduate students.

3 units, autumn and winter quarters (KREHBIEL) W 2-4

110. Seminar in English History.—Students are given advice selecting topics worthy of investigation and are then given individual assistance in preparing a thesis.

3 units, autumn and spring quarters (CANNON) By appointment

113. Seminar in the History of the West.—A study of materials relating to the political phases of westward expansion. Subject 1917-18. Political Parties in Congress, 1834-38.

3 units, autumn and winter quarters (ROBINSON) M 2

116. Seminar in American History.—A study of materials relating to the History of the West. Selected topics in the history of elections.

3 units, summer quarter (ROBINSON) MWF

119. Seminar in American Diplomatic History.—Topics for 1917-18 selected from the period 1836 to 1846.

3 units, winter and spring quarters (ADAMS)
(Winter) MWF 11; (spring) M

122. Seminar in American-European Relations.—Limited to candidates for advanced degrees.

Units various, any quarter except summer (ADAMS)
By appointment

125. Seminar in the History of the Far East.—Each year some phase or period of the relations of the United States with the Far East will be studied, and each student will prepare a thesis on some specific topic of investigation.

3 units, winter and spring quarters (TREAT) T 2

128. Seminar in Japanese History.—Individual investigation under advice and direction of the instructor.

3 units, autumn and winter quarters (ICHIHASHI) Th 2

131. Seminar in Latin American History.—Subject for 1917-18. Diplomatic Relations between the United States and Latin America.

3 units, autumn and winter quarters (MARTIN) M 2

140. Summer Graduate Work.—Students properly qualified, under the University regulations, to pursue genuine graduate studies, will be given special attention and due credit allotted for the work accomplished. Such students will receive individual advice and guidance whether in set courses or in special research. For the summer quarter in 1918, the fields in which graduate work may be thus carried on, as the instructors in attendance are: (1) Mediaeval History, Professor A. B. SHOW; (2) Modern European History, Professor EDWARD KREIER.

BIEL; (3) American History, Assistant Professor E. E. ROBINSON;
(4) Latin-American History, Assistant-Professor P. A. MARTIN.

Units, not to exceed total of 15

Hours by arrangement

LATIN

HENRY RUSHTON FAIRCLOUGH, Professor.

JEFFERSON ELMORE, BENJAMIN OLIVER FOSTER, Associate Professors.

MARY B. TAINTOR, Assistant in Instruction.

[With the co-operation of Professor HEMPL of the Department of Germanic Languages.]

UNDERGRADUATE COURSES

The aim of the undergraduate courses in Latin is to give the student a somewhat systematic knowledge of the language and its development, an acquaintance with the representative authors of Latin literature, and some insight into the life, culture, and civilization of ancient Rome.

The Department recognizes two classes of major students: (1) those who wish to pursue a course of liberal studies, including Latin as a prominent feature; (2) those who, expecting to teach Latin, desire to be properly equipped for that purpose.

Students who wish to qualify for teaching Latin must take courses 3, 4, 6, 7, 8, 9, 10, 11, and 17, together with such other courses as are recommended by the Department. To other students more freedom of choice is allowed.

GRADUATE COURSES

These courses are open to graduates in Latin, and are most profitable to those who have had some undergraduate work in Greek. The ability to read French and German is also very desirable, and, in the case of candidates for the degree of Ph.D., necessary. The aim of the course is to give the student a thorough grasp and detailed knowledge of particular authors, and of certain periods and fields of literary activity, as well as a training in literary criticism, and an acquaintance with the methods of original research.

1a. Cicero.—Selected speeches. Open to those who have passed in entrance subject 8a.

4 units, autumn or spring quarters (TAINTOR)

(Autumn) MTWF 11; (spring) MTWF 11

1b. Virgil.—Aeneid, six books.

4 units, winter or summer quarters (TAINTOR)

(Winter) MTWF 11; (summer) MTWTh 9

3. Terence and Cicero.—The *Andria* of Terence and the *De Senectute* of Cicero. Open to those who have completed course 1, or 2, or who have offered entrance subject 8b.

4 units, autumn or spring quarters

(Autumn, FOSTER); (spring, FAIRCLOUGH) MWFS 9

4. Catullus and Horace.—Selections from Catullus and the Odes and Epodes of Horace. This course is complementary to course 3, but may be taken independently of it by those who have had course 1 or course 2, or an equivalent.

4 units, winter quarter (FOSTER)

MWFS 9

5. Legal Latin.—The Institutes of Gaius or Justinian are read both as a training in language and as an introduction to the main principles of Roman law. The course is useful to all who desire a first hand knowledge of Roman law and of the origins of European social institutions. Open to all students who have had three years of Latin.

3 units, autumn and winter quarters (FAIRCLOUGH) MWF 10

6. Prose Composition I.—Exercises in the writing of Latin prose.

2 units, autumn, winter, and spring quarters (ELMORE) TTh 9

7. Horace.—Satires and Epistles. Open to students who have had courses 3 and 4, or an equivalent. Attention is directed especially to the style and subject-matter, to Horace's influence on Latin literature, and to the salient features of the Augustan Age.

4 units, autumn quarter (ELMORE, FAIRCLOUGH)

MTWF 9

8. Livy and Tacitus.—Selections from Livy's History and the *Agriicola* and *Germania* of Tacitus.

4 units, winter quarter (ELMORE)

MWFS 9

9. Oral Latin.—Practice in speaking Latin and in the direct method of teaching.

2 units, spring quarter (FOSTER)

TThS 9

10. Roman Comedy.—The *Rudens* and *Menaechmi* of Plautus and either the *Trinummus* or Terence's *Phormio*.

4 units, autumn quarter (FOSTER)

MWThF 11

11. The Letters of Cicero.—Selections from the correspondence are read with a view to studying Cicero's character and the political and social conditions of the period.

4 units, winter quarter (FOSTER)

MWFS 8

13. Prose Composition II.—Open to those who have had course 6, or an equivalent.

2 units, winter quarter (FAIRCLOUGH)

TTh 9

14. Juvenal and Martial.—Selections. Open to Seniors and other properly qualified undergraduates.

4 units, autumn or summer quarters (ELMORE)

(Autumn) MTWTh 8; (summer) MTWF 11

17. Teachers' Course.—Lectures on methods of teaching Latin, with practical exercises. Open only to advanced students.

2 units, spring or summer quarters (ELMORE)

TTh 11

GRADUATE COURSES

22a. Latin Seminary.—The Seminary will be devoted to Epic poetry. The Aeneid of Virgil will be studied in its entirety as a work of art, and selected passages will be interpreted. Attention will be paid to classical influence on mediaeval and modern literature. The course will be of special importance to teachers of Latin. Students should provide themselves in advance with a complete text of Virgil, such as that in the Oxford or Teubner series.

4 units, autumn and winter quarters (FAIRCLOUGH)

(Autumn) TF 1:05-3:05; (winter) TTh 1:05-3:05

4 units, summer quarter (FAIRCLOUGH)

TF 1:05-3:05

22b. Latin Seminary.—Caesar's Gallic War. The whole work will be read rapidly, and certain portions will be assigned for more minute study and discussion. Attention will be paid to military antiquities and topography.

4 units, spring quarter (FOSTER)

MW 2-4

26. Introduction to Latin Epigraphy.—Lectures and readings in Latin inscriptions.

2 units, spring quarter (FAIRCLOUGH)

T 1-3

28. Etruscan.—Lectures on the nature of the language and its relation to other Italic dialects.

2 units, summer quarter (HEMPL)

Hours to be arranged.

29. History of Rome.—A general course, open to all students.

4 units, spring quarter (ELMORE)

MTWTh 8

30. Seminary in Roman History.—Open after consultation with the instructor to those who have had course 29, or an equivalent. The subject will be a study from the sources of the years from 65 to 57 B. C. The course is intended to be useful to teachers of Latin and of Roman history.

2 units, autumn quarter (ELMORE)

W 2-4

31a. Roman Art and Archaeology.—A lecture course complementary to Greek 26.

3 units, spring quarter (FAIRCLOUGH)

MWF 8

31b. Classical Art and Archaeology.—A lecture course open to all students.

2 units, summer quarter (FAIRCLOUGH) MW 10

32. Latin Literature.—Lectures on the chief poets and prose-writers of Rome, with assigned readings in English translations. Open to all students.

3 units, winter quarter (FOSTER) TThS 10

35. Representative Poets and Prose Writers.—A reading course open to those who have had course 1, or the equivalent.

4 units, summer quarter (FAIRCLOUGH) MW 10

37. The History of Roman Civilization.—Open to students who have taken course 30 or an equivalent.

4 units, winter or summer quarters (ELMORE)
(Winter) MWThF 8; (summer) TWThF 8

38. Lectures on the History of Latin Sounds and Forms.

3 units, autumn quarter (FOSTER) MWF 8

39. Roman Oratory.—A study of Roman oratory based on Cicero's *de Oratore* and Tacitus' *Dialogus*. Open to graduate students, and to others upon the invitation of the instructor.

2 units, winter quarter (ELMORE) W 2-4

40. Roman Elegy.—Selections from the poems of Tibullus, Propertius, and Ovid. Open to those who have had the equivalent of courses 3 and 4.

4 units, spring quarter (FOSTER) MTWTh 8

41. Tacitus.—A reading course in the *Annals*, XI-XVI. Open to graduates and to properly qualified undergraduates.

4 units, spring quarter (ELMORE) TTh 2-4

42. Venetic.—Lectures on the nature of the language and its relation to other Italic dialects.

2 units, winter (HEMPL) Hours to be arranged

LAW

CHARLES ANDREWS HUSTON, ARTHUR MARTIN CATHCART, JOSEPH WALTER BINGHAM, CLARKE BUTLER WHITTIER, CHESTER GARFIELD VERNIER, Professors.

MARION RICE KIRKWOOD, Associate Professor.

THOMAS ARMITAGE LARREMORE, Instructor.

HENRIE GRANVILLE HILL, OSCAR KENNEDY CUSHING, Lecturers.

THE LAW SCHOOL

The Law School was established, as a department of the University, in 1893. Its purpose is to provide a thorough legal education for students who are fitted by their maturity and their previous academic training to pursue professional study under university methods of instruction. The curriculum covers three academic years and constitutes an adequate preparation for the practice of law in any English speaking jurisdiction. Elective courses in Code Pleading and in California Practice are offered, and graduates of this school are admitted to the California Bar without examination. A comprehensive group of courses in Public Law, of value not only to the law student but to the student who contemplates entering the diplomatic, consular, or other government service, is a feature of the curriculum.

Only college graduates and students who have completed two years of work in the pre-legal curriculum of this University, or its equivalent, are admitted as regular students. Under certain conditions persons over twenty-three years of age who are eligible for admission to the University as regular students may be admitted to the Law School as unclassified students, not candidates for a degree.

THE LIBRARY

The Law Library contains 21,000 volumes, including complete sets of the English, Irish, Scotch, Australian, and Canadian reports, the reports of all Federal courts, a practically complete set of the reports of the American States, the Australian States, and the Canadian Provinces, the National Reporter system, the standard collections of cases, the standard English and American legal encyclopedias, the principal American, English, and Canadian digests and citators, sets of the leading American, British, Canadian, and Continental legal periodicals, together with a good collection of text-books. There is also a somewhat complete collection of compiled laws, session laws, and other statutory material both Federal and State, as well as British, Canadian, and Australian.

The class of 1911, upon graduation, adopted a plan for the purchase, from time to time, of works on Legal History. This collection is known as the "Class of 1911 Memorial Collection on Legal History." The class of 1912 adopted a similar plan for the purchase of a memorial collection of celebrated trials.

Through the generosity of Justice McFarland, and his successor, Justice Melvin, the Library has received, since 1907, a complete set of the records of the California Supreme Court, and through the generos-

ity of Justice Sloss a complete set of the records of the District Courts of Appeal.

The University Libraries are also available for use by students of the Law School.

ADMISSION TO THE LAW SCHOOL

Admission to the professional curriculum in law is granted to students duly enrolled in the University, as follows:

I. To students who have received the degree of Bachelor of Arts, or an equivalent degree, from this University or some other institution of recognized collegiate rank.

II. To students who have received credit for substantially two years of work (80 units) offered by this University, including the six units of English Composition; or the substantial equivalent of these 80 units in some other institution of recognized collegiate rank.

III. In the discretion of the Faculty of Law, to students over twenty-three years of age who cannot meet the foregoing requirements, but who are eligible for admission to the University with 15 units of entrance credit. Such students are termed "unclassified," and are given a certificate in lieu of the degree conferred upon regular students.

ADMISSION TO THE BAR

It is provided by Section 280b of the California Code of Civil Procedure, that any person producing evidence of having satisfactorily completed the three years' course of law study prescribed by this Law School, shall be entitled to a license to practice law in all the courts of the State, subject to the right of the chief justice of the Supreme Court to order an examination, as in ordinary cases of applicants without such evidence. The certificate required by the statute will be issued, upon request, to any regular or special student who shall have received an aggregate of 115 units of credit in the Law School, including credit in Pleading and California Practice and excluding credit in the course in Introduction to the Study of Law, and who, in addition thereto, shall have received credit in the course in English Composition (English 2).

INSTRUCTION IN PRACTICE

A special effort is made to impart to the student a thorough knowledge of the rules of procedure and practice, and to enable him to acquire a creditable degree of skill and facility in the application of such rules to conditions of actual litigation. To these ends, courses are offered in Common Law and Code Pleading, and in California Practice. In the last-mentioned course particularly, the student is af-

forded practical experience in the commencement of actions, the preparation of pleadings, the trial of issues of fact, and the argument of questions of law.

Moot Court

A Moot Court, for the argument of questions of law, is conducted by the Faculty. Sessions are held four hours a week throughout the spring quarter, and the work is open to second- and third-year law students.

ORDER OF THE COIF

A chapter of the Order of the Coif, a national law school honor society, founded to encourage scholarship and to advance the ethical standard of the legal profession, was established in the law school in 1912. In the spring quarter of each year, such third-year law students as are deemed worthy of the distinction, selected from the ten per cent of the class ranking highest in scholarship, are elected to membership.

LAW SCHOOL CURRICULUM

Fundamental courses which are listed below as first-year courses are prescribed. Courses listed as second- and third-year courses may be taken in any order consistent with their special prerequisites, but the courses in Administrative Law, Conflict of Laws, Constitutional Law, Private Corporations, Municipal Corporations, Evidence, and California Practice may not be taken, ordinarily, before the third year.

The courses offered in the Law School are as follows:

PRELIMINARY COURSE

[Open to students of all departments who have 80 units of credit, and required of students in the Law School.]

1. **Introduction to the Study of Law.**—Nature, sources, and sanction of law; outline of the historical development of English and American courts and procedure; the content, classification, and determination of rules of law, including a consideration of legal rights and duties, the doctrine of *stare decisis* and the development of some of the more elementary rules of law by combining and comparing decisions; use of law books and the law library. Selected readings and cases.

4 units, autumn quarter (KIRKWOOD)

MTWF 11

FIRST-YEAR COURSES

2. **Contracts.**—The formation of contracts: offer and acceptance; consideration; contracts under seal. Parties affected by contracts: beneficiaries; assignees; joint and several contractors. The perform-

ance of contracts; express and implied conditions; anticipatory breach; Impossible and illegal contracts. Discharge of contracts. Williston Cases on Contracts, and selected California Cases.

4 units, winter and spring quarters (WHITTIER) MTWTF 9

3. Torts.—Trespass to person, to real property, and to person's property; excuses for trespass; conversion; legal cause; negligence; contributory and imputed negligence; plaintiff's illegal conduct as defense; duties of land-owners; hazardous occupations; liability for animals; deceit, defamation, slander, libel, privilege, malice; malicious prosecution, criminal and civil; interference with social and business relations, inducing breaches of duty, fair and unfair competition, strikes, boycotts, business combinations. Case book to be announced.

4 units, winter and spring quarters (CATHCART)
(Winter) MWFS 9; (spring) TWFS 9

4. Criminal Law.—Nature and sources of criminal law; crime as an act; attempts; criminal intent; circumstances affecting illegality of act; specific offenses; crimes against the person, larceny and allied offenses, crimes against the dwelling-house, conspiracy. Beale, Cases on Criminal Law.

6 units, autumn quarter (VERNIER) MTWThFS 10

5. Introduction to Property.—Adverse possession, prescription, accretion; creation of interests in land by agreement or conveyance, methods of transferring interests in land at common law and under statutes, execution of deeds, interpretation of instruments of conveyance, covenants for title, conditions, fraudulent conveyances, recording. Case book to be announced.

4 units, winter quarter and 3 units, spring quarter; or 7 units, summer quarter (KIRKWOOD) (Winter) MTWTF 8;
(spring) TThS 8; (summer) MTWThFS 8, W 1:05

6. Agency.—Nature of relation; appointment; liabilities of principal for agent's torts, contracts, crimes; liabilities of agent; parties to writings; undisclosed principal doctrines; delegation of agency; termination; ratification. Prerequisite: 4 units of Contracts (Law 2), and 4 units of Torts (Law 3). Wambaugh, Cases on Agency.

6 units, spring quarter (HUSTON) MTWThFS 10

SECOND- AND THIRD-YEAR COURSES

10. Constitutional Law I.—Making and changing constitutions; function of judiciary in enforcing constitutions; separation and delegation of powers; political rights; personal liberty; interstate privileges

and immunities of citizens; operation of fourteenth amendment; due process and equal protection of law; procedure; police power; taxation; eminent domain. Hall, Cases on Constitutional Law.

3 units, autumn quarter (CATHCART) MWF 9

11. Constitutional Law II.—General scope of federal powers; foreign relations, Indians, aliens; territories, dependencies, new states; federal taxation; regulation of commerce; intergovernmental relations; protection to persons accused of crime; retroactive laws in civil cases; state laws impairing obligation of contracts; jurisdiction of federal courts. Hall, Cases on Constitutional Law.

3 units, winter quarter (CATHCART) MWF 11

12. Administrative Law and Public Officers.—Administrative regulations; jurisdiction, discretion, adjudication; enforcement of orders; habeas corpus; mandamus; certiorari; equitable jurisdiction in public law. Freund, Cases on Administrative Law.

4 units, summer quarter (HUSTON) MTThS 8

13. Municipal Corporations.—Nature; creation, alteration, and dissolution; internal organization; powers; liabilities on contract and for torts; remedies. Beale, Cases on Municipal Corporations, and selected California cases.

5 units, winter quarter (HUSTON) MTWFS 8

14. International Law.—International Law defined and distinguished from Municipal Law. International relations in time of peace: definition, recognition, and classification of states; effect of change of sovereignty; jurisdiction on land and on the high seas; nationality. International relations as modified by war: measures short of actual war; effects of war as between enemies; relations between belligerents and neutrals. Open to all law students and to advanced students in other departments. Scott, Cases on International Law.

4 units, spring quarter (LARREMORE) TWTThF 10

15. Conflict of Laws.—The principles and rules of "private international law" determining the extent to which the domestic system of law adopts and applies provisions of foreign systems in cases involving extra-territorial factors; more especially (1) nature and effect of domicile and nationality; (2) jurisdiction of courts in proceedings *in personam*, proceedings *in rem*, and proceedings for divorce; (3) respective applicability and effect of domestic laws and foreign laws in relation to marriage and other domestic relations; contractual, quasi-contractual, delictual, and judgment obligations; the creation, transfer,

taxation, devise, and inheritance of all forms of property interests. Beale, Cases on Conflict of Laws.

6 units, spring quarter (BINGHAM) MTWThFS 8

16. Admiralty.—Admiralty jurisdiction, basis; maritime contracts, torts, and crimes; maritime liens, *ex contractu*, *ex delicto*, priorities, discharge; bottomry and respondentia obligations; salvage; general average. Ames, Cases on Admiralty.

3 units (KIRKWOOD) [Not to be given in 1917-18.]

17. Roman Law.—A comparative study of some leading conceptions of the Roman Law, and its modern developments in the Civil Law of Continental Europe and America, with the related conceptions of the Anglo-American Common Law. Required reading.

4 units (HUSTON) [Not to be given in 1917-18.]

20. Landlord and Tenant.—Creation of relationship; duration of tenant's interest, remedies of landlord for non-performance of tenant's obligations, remedies of tenants against landlord, covenants running with the land as between landlord and tenant, rights and duties of landlord and tenant with respect to third persons. Case book to be announced.

4 units (KIRKWOOD) [Not to be given in 1917-18.]

21. Rights in the Land of Another.—Natural rights, easements, covenants running with the land, public rights, franchises, rents. Gray, Cases on Property, Vol. II (2d ed.), and selected California cases.

4 units (KIRKWOOD) [Not to be given in 1917-18.]

22. Wills.—Acquisition of property on the death of former owner; escheat, descent, occupancy, gifts, *mortis causa*, the making, revocation, and republication of wills, ademption and lapse of legacies. Prerequisite, course 5. Gray, Cases on Property, Vol. IV (2d ed.), and selected cases.

4 units, winter quarter (BINGHAM) MW 9, F 10, T

23. Future Interests.—Vested and executory interests; construction of language creating future interests; powers; rule against perpetuities; provisions for forfeiture and restraints on alienation. Prerequisite, courses 7 and 15. Gray, Cases on Property, Vol. V and part of Vol. VI (2d ed.), and selected cases and statutes.

6 units, autumn quarter (BINGHAM) MTWThFS

24. Water Rights and Irrigation Law.—A course in the intensive study of the law of water supply rights, with especial reference to

water rights in the Western States. Selected cases and legislative enactments.

4 units, summer quarter (BINGHAM) MWFS 9

25. Mining Law.—A course on mining titles under the Federal mining acts, with especial reference to mining rights in the Western States and Alaska. Costigan, Cases on Mining Law; and legislative enactments.

4 units, summer quarter (BINGHAM) MWF 11, Th 2:05

26. Persons and Domestic Relations.—Infants: period of infancy; infants' contracts and conveyances, torts, and crimes. Husband and wife; rights of husband as to wife's property; rights of each as to earnings, services, and society of the other; husband's interest in damages for tort to wife; husband's liability for torts or contracts of wife; husband's duty to support wife and wife's authority to bind husband by her contracts; married women's contracts, conveyances, and devises; estoppel of married women; liability of married women for torts and responsibility for crimes; contracts, conveyances, and suits between husband and wife; husband's right to custody of wife. Marriage: promise to marry and breach; marriage as a contract or relation; annulment; divorce; separation. Kales, Cases on Persons and Domestic Relations, and Vernier, Cases on Marriage and Divorce.

4 units, autumn quarter (LARREMORE) TWF 11, M 1:05

27. Quasi-Contracts.—Origin and nature of quasi-contracts: Benefits conferred in misreliance on right or duty; general principles; misreliance resulting from mistake of law; misreliance on invalid contract, on contract unenforceable because of Statute of Frauds, on illegal contract, on contract impossible of performance, on contract unenforceable because of breach, on supposed requirement of valid contract, on non-contract obligation, on ownership of property: Benefits conferred through dutiful intervention in another's affairs: Benefits conferred under constraint; constraint of duress, of legal proceedings, of tax or assessment: Action for restitution as alternative remedy for breach of contract and for tort.

4 units, autumn quarter (CATHCART) TW 11, MF 2:05

28. Public Utilities.—The nature, rights, and duties of public service callings; railroads and canals; telephone and telegraph; gas, water, irrigation, and other public utilities. Wyman, Cases on Public Service Companies (2d ed.).

3 units (CATHCART) [To be given in 1918-19.]

29. Bailments and Carriers.—Bailments in general, including bailments for hire, for services to be performed, and for hired use. Special classes of bailments involving ordinary liability: pledges; warehousemen. Special classes of bailments involving exceptional liability: innkeepers; common carriers of goods; common carriers of passengers. Case book to be announced.

4 units, autumn quarter (LARREMORE)

MWThF

30. Sales.—Subject matter of the contract; transfer of property a title; destruction of the goods and risk of loss; obligations of seller a buyer; rights of unpaid seller against the goods; remedies of the seller on the contract; remedies of the buyer on the contract; Statute Frauds. Woodward, Cases on Sales.

6 units, winter quarter (VERNIER)

MTWThS 10, F 2

30a. Sales.—Course 30 abbreviated.

4 units, summer quarter (—————)

MTWTh

31. Bills and Notes.—Negotiability; form and inception, form bill and of note, acceptance, delivery, consideration; negotiation, transfer, holder in due course; liability of parties, maker and acceptor, drawer and indorser, transferee; discharge; effect of the Negotiable Instruments Law and California statutes. Colson's Huffcut's Cases Bills and Notes.

6 units, spring quarter (VERNIER)

MTWThF

32. Partnership.—Nature of a partnership, its purposes, and members; creation of partnerships; nature of partner's interest; firm name and good will; mutual rights and duties of partners; actions between partners, at law and in equity; powers of partners; liability for acts of partners in contract and tort; general liability of partner dissolution and notice; consequences of dissolution; dissolution agreements respecting debts; distribution of assets to creditors, and between partners; limited partnerships. Case book to be announced.

4 units, winter quarter (LARREMORE)

Th 8, MW 1:05, F

33. Private Corporations.—The nature of a corporation; the formation and organization of corporations; irregular incorporation; corporate powers; *ultra vires*; promoters; directors; shareholders; creditors; stock issue and payment, transfer. Open to third-year students only. Warren (2d ed.), Cases on Corporations, and selected California cases.

6 units, autumn quarter (HUSTON)

MTWThFS

34. Insurance.—Marine, fire, and life insurance. Insurable interests in various kinds of policies; concealments; misrepresentations; w

ranties and other matters affecting the validity of the contract; amount of recovery; subrogation; waiver, estoppel, election; powers of agents; assignees and beneficiaries.

4 units, summer quarter (HUSTON) TS 11, WF 8

35. Suretyship.—Personal suretyship compared with real suretyship (mortgages, pledges, liens, etc.); suretyship obligations compared with insurance and indemnity obligations; guaranty and other forms of suretyship in relation to the Statute of Frauds; suretyship in transactions involving negotiable instruments; fidelity contracts and judicial bonds; surety's defenses due to original defects in his obligation or to its subsequent discharge; surety's right to subrogation, indemnity, contribution, or exoneration; creditor's right to surety's securities. Ames, Cases on Suretyship.

4 units (VERNIER) [To be given in 1918-19.]

36. Mortgage.—All forms of mortgage security, both real and chattel; essential elements of legal and equitable mortgages; legal and equitable rights, powers and remedies of mortgagor and mortgagee with respect to title, possession, rents and profits, waste, collateral agreements, foreclosure, redemption; priorities; marshaling; extension of mortgages; assignment of mortgages; discharge of mortgages. Kirchwey, Cases on Mortgage.

4 units, summer quarter (————) TTh 9, WF 2:05

37. Equity I: Contracts.—Development and nature of equity jurisdiction; specific performance of contracts; reformation and rescission of contracts. Ames, Cases on Equity Jurisdiction Vols. I and II.

3 units, autumn and winter quarters (KIRKWOOD)
(Autumn) TTh 9, W 2:05; (winter) TThS 9

37a. Equity I.—Course 37 abbreviated.

4 units, summer quarter (————) WF 8, TS 11

38. Equity II: Trusts.—The Anglo-American system of uses and trusts. The creation, the transfer, and the extinguishment of all forms of trust interests, express, resulting, and constructive; priorities between competing equities; the construction of trust dispositions; the special doctrines of charitable trusts. Ames, Cases on Trusts (2d ed.).

6 units, winter quarter (BINGHAM) MTThFS 8, W 2:05

39. Equity III: Torts and Special Equitable Remedies.—Specific reparation and prevention of torts; bills of interpleader; bills of peace; bills *quia timet*; cancellation of contracts, removal of clouds on title;

perpetuation of testimony; bills to secure rights of future enjoyment; bills of account. Ames, Cases on Equity Jurisdiction, Vols. I and II.

4 units, spring quarter (KIRKWOOD) MThF 10

40. Damages.—Respective functions of court and jury in estimating damages; exemplary, liquidated, nominal, direct, and consequential damages; avoidable consequences; counsel fees; certainty, compensation, damages for non-pecuniary injuries; value; interest; and damages in certain actions of tort and contract. Mechem and Gilbert, Cases on Damages (2d ed.).

3 units, winter quarter (LARREMORE) WS 8, F 1 : 05

41. Bankruptcy.—Jurisdiction of the United States and the several States; who may be a bankrupt; who may be petitioning creditors; acts of bankruptcy; what property passes to the trustee; provable claims; duties and powers of the bankrupt and his trustee; protection, exemptions, and discharge. Williston, Cases on Bankruptcy.

4 units, spring quarter (VERNIER) MTWF 11

42. Common Law Pleading.—The principal forms of action: their scope; the necessary allegations; methods of pleading defenses. General principles; concerning substance; concerning form; objection to defects; curing defects; dilatory objections; cross-demands. Whittier and Morgan, Cases on Common Law Pleading.

4 units, autumn quarter (WHITTIER) MWFS 9

43. Code Pleading.—The civil action; parties; splitting and joining actions; the complaint, including the facts constituting the cause of action, the methods of stating them, and the prayer for relief; the answer, including general and specific denials, affirmative defenses and counterclaims; the demurrer; the reply; motions; bills of particulars; amendment and aid; construction of pleadings. Prerequisite: course 36. Selected cases.

4 units, spring quarter (CATHCART) T 9, MWF 11

44. Evidence I.—Introductory topics: Witnesses: competency; privilege; examination; impeachment; rehabilitation. Rules of exclusion: conjectural evidence; character evidence; hearsay and the exceptions to its exclusion; opinion. The proof of writings: authorship; contents. Real evidence. Open to students having 50 units of credit in law. Thayer, Cases on Evidence (2d ed.).

3 units, winter and spring quarters (WHITTIER)
(Winter) TThS 9; (spring) MThS 9

45. Evidence II.—This course deals with certain procedural and substantive law topics commonly considered in connection with evidence

ough not strictly a part of that subject. They are: functions of court and jury; judicial notice; presumptions; burden of proof; the trial evidence rule including construction of instruments. This course could be preceded by Evidence I when practicable. Open to students having 60 units of credit in law. Thayer, *Cases on Evidence* (2d. ed.).

3 units, autumn quarter (WHITTIER) TTh 9, M 11

6. California Practice I.—Organization and jurisdiction of courts; court records and files; proceedings prior to judgment, including: service and return of summons and motions relating thereto, appearances, provisional remedies, such as attachment, arrest, etc., *lis pendens*, the trial, exceptions and findings, verdict; the judgment, its entry and satisfaction; proceedings subsequent to judgment, including: stay of execution, costs, execution, motion for new trial, appellate proceedings; probate and administration proceedings. Prerequisite: course 37. Open to students having 50 units of credit in law. California Code of Civil Procedure; also selected California cases.

2 units, autumn and winter quarters (HILL) S 11, Th 2:05

7. California Practice II.—Trial practice, special proceedings, including writs of certiorari, mandamus, and prohibition; introduction to jurisdiction and procedure of Federal courts. Prerequisites, courses 3 and 46. Open to students having 50 units of credit in law. California Code of Civil Procedure; also selected California cases.

2 units, spring quarter (HILL) S 11, Th 2:05

8. Moot Court.—

A. Instruction in Legal Bibliography and the use of law books.

B. Argument of cases on submitted statements of facts; briefs; comparison of opinions.

4 units, spring quarter (LARREMORE) MW 1:05, MF 2:05

SPECIAL LECTURES

In addition to the regular professional courses, a few special lectures, most of them of a practical character, are given each year by experienced lawyers of the California Bar.

COURSES IN OTHER DEPARTMENTS

Courses offered by other Departments of the University are open to pre-legal and law students. Of special interest and importance are the course in the Institutes of Justinian in the Latin Department, the courses in Constitutional History in the History Department, and various courses in Economics and Political Science.

VIII. THE SUMMER TERM

The primary purpose of the Summer Term is to enable law students in this and other schools, to shorten materially the period of preparation for the bar, attendance at two summer terms making it possible to complete the three years' law curriculum in two and one-half calendar years. Incidentally, however, an opportunity to obtain systematic university instruction in law is afforded other persons of adequate training.

The Summer Term for the year 1917 will open Monday, June 25 and continue for six weeks, closing Saturday, August 4.

The following courses will be given:

4a. Criminal Law.—Identical with course 4 in the regular curriculum.

4 units Professor VERNIER

15a. Conflict of Laws.—Identical with course 15 in the regular curriculum.

4 units Professor BINGHAM

27a. Quasi-Contracts.—Identical with course 27 in the regular curriculum.

2 units Professor CATHCART

43a. Code Pleading.—Identical with course 43 in the regular curriculum.

2 units Professor CATHCART

NOTE.—The unit value of these courses is on the basis of a requirement of 120 units for the A.B. degree and 75 units of professional work for professional degrees. The change from the semester-length of courses to the quarter-length necessitates the change of unit-value after this session from this basis to the one set out on pages 8 and of the Law School announcement.

The above courses will be open to all students who are qualified for admission to the regular law school curriculum (see page 9), except that for admission to Quasi-Contracts and Conflict of Laws a knowledge of Contracts and Torts will be required.

The tuition fee for the summer term will be twenty-five dollars. In addition there will be a syllabus fee of fifty cents for each course. If other fees will be charged.

LIBRARY

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CHARLES V. PARK, Assistant Librarian.

HELEN BINNINGER SUTLIFF, Chief Cataloguer.

ALICE NEWMAN HAYS, Reference Librarian.

ELIZABETH HADDEN, Chief of Order Department.

LUCIA MAY BROOKS, Chief of Serial Department.

LOUISE OPHÜLS, Medical Librarian.

THOMAS LAFAYETTE DYER, Law Librarian.

The Library is open during term time on week days from 8 a.m. to 10 p.m., except on Saturdays, when it is closed at 5 p.m. During vacations the hours are from 8:30 a.m. to 4:30 p.m., Saturdays to 12:30 p.m. The shelves are open to members of the faculty, and to students engaged in advanced work upon the recommendation of their instructors. Books, other than works of reference, not required for class use, are lent for a period of two weeks.

Including the departments of Law and Medicine the Library contains upward of 284,000 volumes. The income of the Jane Lathrop Stanford Jewel Fund, certain other special funds, and fees provide amply for its maintenance and growth. Noteworthy special collections are as follows:

THE JORDAN LIBRARY OF ZOOLOGY.—A collection consisting largely of works on ichthyology, to a considerable extent made up of a vast number of authors' separates, which have been accumulated by Chancellor JORDAN, bound in convenient form, indexed, and catalogued. The more voluminous publications, such as the works of Cuvier, Lacépède, Bloch, Bleeker, Gunther, and others, are well represented. These, supplemented by the proceedings of various societies and institutions, make a collection of books of great value to advanced students and investigators in ichthyology. The library is conveniently arranged, and is situated in the Zoology building near the laboratories and collections.

THE BARBARA JORDAN LIBRARY OF BIRDS.—A memorial collection presented by Chancellor JORDAN, and to which frequent additions are made. While some of the older texts are not represented, it is a good working library of ornithology and contains the principal modern works on the subject.

THE HOPKINS RAILWAY LIBRARY.—A collection of approximately 10,000 volumes and pamphlets dealing with the subject of transportation. In 1892 Mr. TIMOTHY HOPKINS, of San Francisco, presented to the University his private library on railroads, consisting of about 2,000

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books, personally providing for its maintenance and growth for many years. The collection is shelved by itself in one of the seminar rooms. It is general in scope, intended to embrace all subjects touching on the building, maintenance, and operation of railways. It is especially rich in state and government reports, as well as in reports of individual railroads both in the United States and Europe, with much material pertaining to their history.

THE HILDEBRAND LIBRARY.—In 1895 the University acquired the library of Professor Hildebrand, of Leipzig, containing more than 5,000 volumes and pamphlets relating largely to Germanic languages and literature, the seventeenth and eighteenth centuries being especially well represented, and including also a notable collection of three hundred old dictionaries. The value of the books is greatly enhanced by the manuscript notes of Professor Hildebrand.

THE FLÜGEL COLLECTION, which formed the more important part of Dr. Ewald Flügel's library, was purchased in 1915 and numbers about 4,000 volumes. It contains copies of the 15th century editions of Vincent of Beauvais, a number of important and rare 16th century writers (e. g., Bale's *Catalogus*, 1557-9; Luther, 1539-59; More, 1557; Holinshed, 1586), and a good many 17th century 4tos and folios (Islip's *Chaucer*, Selden, Browne, Stow, etc.). The history of philology is well illustrated (Spelman, Junius, Hicks, et al.). The library has now a solid foundation in these fields and can supply a large amount of material for the study of certain aspects of the 16th and 17th centuries.

THE THOMAS WELTON STANFORD AUSTRALASIAN LIBRARY.—A good working collection of books relating to Australia and New Zealand. It is especially rich in early voyages, travels, and descriptions. Several hundred volumes of parliamentary reports of the Australian states, the Commonwealth, and New Zealand, are included. The publications of learned societies, such as the Royal Societies of New South Wales and Victoria, the Australian Museum, and the New Zealand Institute, are well represented, while considerable pamphlet material also is available.

BRITISH PARLIAMENTARY PAPERS.—An unusually complete set of British government documents from 1801 to date, some 6,500 volumes, of which the first 3,500 volumes constituted a special gift to the Library, made by Mrs. Stanford in 1900. The set contains not only the full papers laid before Parliament from the customary departments of government, such as diplomatic, colonial, and financial papers, but also the most valuable reports of the special committees and royal commissions, offering material for research in almost every field of knowledge. Taken in connection with the Library's excellent file of United

States Documents, and of the governmental publications of Canada, and of Australasia, the collection offers unusual facilities for study in the public undertakings of English-speaking peoples.

THE JARBOE COLLECTION ON THE FRENCH REVOLUTION.—Acquired in 1910. It contains original materials, principally in French, relating to the Revolutionary and Napoleonic era. Two features of the collection are of particular interest to advanced students of history—the original and contemporaneously printed pamphlets, of which many are unusual; and the memoirs, of which there is a comprehensive selection.

THE LAW LIBRARY.—A library of about 21,000 volumes, selected with care and adequate for the study of English and American law. It contains practically complete sets of the reports of the courts of England, Scotland, Ireland, Canada, the United States and the several states, together with a valuable collection of statutes, treatises and periodicals.

THE LANE MEDICAL LIBRARY.—Founded by the directors of Cooper Medical College in accordance with the bequest of Mrs. L. C. Lane. The Library contains about 43,000 volumes, and is particularly rich in its collection of medical and allied periodicals. The leading domestic and foreign journals are currently received. The new library building, erected in 1912, is a fireproof structure of Colusa sandstone, and is located opposite the other medical buildings, on the corner of Sacramento and Webster streets, San Francisco.

THE BRANNER GEOLOGICAL LIBRARY.—The Geological Library (room 333) is the result of twenty-five years of painstaking acquisition by Dr. JOHN CASPER BRANNER. It includes a vast wealth of material relating to geology, paleontology, mineralogy, geography, mining and metallurgy. It is especially well equipped with files of journals and the transactions of scientific societies, together with a large collection of state and government reports.

MARINE BIOLOGICAL LABORATORY

Professors CHARLES HENRY GILBERT and FRANK MACE MCFARLAND
Directors.

The present Laboratory buildings are located at Pacific Grove, two miles west of Monterey, and stand on a low bluff immediately facing the sea. They consist of two two-story structures capable of accommodating about eighty students, and contain four general laboratories, one lecture-room, seventeen private rooms for special investigators, and a dark-room for photography. They are provided with running water, both

salt and fresh, and provision is made for individual aquaria. A site of about seven acres, at China Point, has been secured, and a concrete building specially planned for the uses of the Laboratory is under construction.

The library and apparatus of the University are available for use in the Laboratory.

SESSION OF 1917

Assistant Professor WALTER KENRICK FISHER, Instructor in Charge.—The Twenty-sixth Session will extend over a period of six weeks, beginning May 21st and closing June 30th.

COURSES OF INSTRUCTION

1. **General Zoology.**—A course of laboratory work, lectures, and field excursions, designed to illustrate the structure and relationships of the principal groups of animals. Open to all students. (STARKS)

2. **Marine Invertebrates.**—A study of the groups of invertebrate animals found in the sea, with especial reference to relationships and ecology. (FISHER)

3. **Embryology.**—A course in vertebrate embryology based upon the chick and mammal. (FISHER)

4. **Advanced Work.**—Students who are prepared may take up definite problems connected with the anatomy and classification of invertebrates. (FISHER)

The sessions of the Marine Laboratory form a part of the biological work of Stanford University. Students who register at Pacific Grove and satisfactorily complete the prescribed work, receive six units of University credit. A laboratory fee of twenty-five dollars is payable in advance.

To investigators engaged in research, the use of the laboratory is offered free of charge.

Pacific Grove is a quiet seaside resort, well supplied with hotels and cottages, where no difficulty is experienced in obtaining boarding and accommodations with a considerable range in price.

MATHEMATICS

ROBERT EDGAR ALLARDICE, RUFUS LOT GREEN, HANS FREDERIK BLICHFELDT, Professors.

———, Assistant.

The courses in this department have been arranged to meet the want of two classes of students—students whose major subject is Mathe

atics, and students who, while taking their major in some other department, desire to include some mathematics in their course. Students in Engineering are provided for in the Department of Applied Mathematics.

For students whose major subject is Mathematics the following programme of work is recommended: In the first year, courses 3 and 4; in the second year, courses 5 and 6; in the third year, courses 10, 11 and 12; while the work during the fourth year and for graduate students may be selected from the remaining courses, and from the Department of Applied Mathematics. The advanced courses will, for the most part, be given once in two or once in three years, and it is hoped that the advanced students will thus have the opportunity of studying the more important branches of modern mathematics.

Students whose major subject is Mathematics are recommended to begin the study either of French or of German in their freshman year.

Students who desire to take one or more years of Mathematics as a part of a liberal training are recommended to begin their work in this Department with one or more of the courses 1, 2, 3, and 7.

The **TEACHER'S RECOMMENDATION**.—For the High School Recommendation in Mathematics the following courses are required: 1, 2, 3, 4, 5, and 6.

1. Trigonometry.—Elementary course with applications involving logarithmic calculation.

3 units, autumn or winter quarters (———) MWF 9

2. Solid Geometry.—Elementary course.

3 units, spring quarter (———) MWF 9

3. Algebra.—Fundamental laws, degree, symmetry, indeterminate coefficients, remainder theorem, factors, introduction to theory of equations. Presupposes entrance credit in elementary algebra.

5 units, autumn and winter quarters (———) MTWThF 8

3a. Algebra.—Binomial theorem, equations, progressions, logarithms, interest, annuities, insurance problems in investment. Presupposes entrance credit in Algebra.

5 units, autumn and winter quarters (GREEN) MTWThF 8

4. Co-ordinate Geometry.—An elementary course in the analytic geometry of the conic sections. Presupposes course 3.

5 units, spring quarter (GREEN) MTWThF 8

5. Co-ordinate Geometry.—A continuation of course 4.

5 units, autumn quarter (GREEN) MTWThF 10

- 6. Differential and Integral Calculus.**—An elementary course.
5 units, winter and spring quarter (ALLARDICE) MTWThF
- 7. General Course.**—A brief and elementary survey of the principles of algebra, trigonometry, co-ordinate geometry, and calculus. Presupposes elementary algebra and plane geometry.
5 units, winter and spring quarters (BLICHFELDT) MTWThF 1
- 9. Modern Co-ordinate Geometry.**
5 units, winter quarter (GREEN) MTWThF
- 10. Advanced Calculus.**—A continuation of course 6.
5 units, autumn quarter (ALLARDICE) MTWThF 5
- 11. Differential Equations.**
5 units, winter quarter (BLICHFELDT) MTWThF 9
- 12. Theory of Functions.**—An elementary course.
5 units, spring quarter (ALLARDICE) MTWThF 5
- 15. Determinants and the Theory of Equations.**
4 units, autumn quarter (BLICHFELDT) MTWF 11
- 20. Algebraic Numbers.**
4 units, autumn quarter (ALLARDICE) MTWF 1
- 21. Projective Geometry.**
4 units, winter quarter (ALLARDICE) MTWF 1
- 22. Non-Euclidean Geometry.**
4 units, spring quarter (BLICHFELDT) MTWF 1

MEDICINE

WILLIAM OPHÜLS, Dean.

GEORGE BURBANK SOMERS, Secretary of the Medical Faculty.

BUILDINGS AND EQUIPMENT

The main buildings in San Francisco occupy four fifty-vara lots bounded by Clay, Sacramento, and Webster streets, and consist of the Clinical and Laboratory Building, including Lane Hall and Lane Hospital, modern building in brick and stone, with a capacity of one hundred and eighty beds. The Lane Medical Library is situated on the corner of Sacramento and Webster streets, opposite the Clinical and Laboratory Building. The nurses are housed in several buildings on Clay street opposite the Lane Hospital. The Clinical and Laboratory Building

ing has recently been remodeled and is devoted entirely to out-patient clinics and laboratories.

CLINICAL OPPORTUNITIES

The Stanford Hospitals

LANE HOSPITAL

Lane Hospital was designed as a Teaching Hospital and built by Dr. Levi Cooper Lane. It is under the immediate control of the Clinical Committee appointed from the Medical Faculty by the President of the University with the approval of the Board of Trustees. It is a general hospital receiving both private and clinic patients, situated at Clay and Webster streets and directly connected with the Clinical and Laboratory Building. In its clinical department there are over one hundred beds used for purposes of teaching. These are arranged into five wards, one each for Surgery, Medicine, Gynecology, Obstetrics, and Pediatrics. As the patients in these clinical beds are sent in largely from the Out-patient clinic and as they remain in the Hospital for short periods of time only, unusual opportunity is offered for the study of selected cases.

STANFORD UNIVERSITY HOSPITAL

Work has begun on the construction of a new surgical pavilion, to be known as the Stanford University Hospital, to accommodate one hundred and eighty patients. The engine-room and power-house for this new hospital are now completed and a large central laundry has been constructed. It is expected that the new building will be ready for occupancy about the beginning of the next academic year (i. e., October 1st, 1917).

The tuberculosis clinic is held in close co-operation with the San Francisco Association for the Study and Prevention of Tuberculosis.

The Associated Charities sends to the clinic a portion of its maternity cases, and provision is also made for the care of a portion of their sick poor. The San Francisco Maternity contributes a considerable sum towards the support of the Women's Clinic. This is particularly devoted to out- and in-patient obstetrics. The Fruit and Flower Mission assists greatly in the care of maternity cases.

COURSE IN EMERGENCY MEDICINE AND SURGERY

Students in the senior year in medicine are offered an opportunity to do emergency work in Medicine and Surgery at the various Emergency Hospitals in the City, under the direction of the Chief Surgeon of the Emergency Service. The course is optional, but students signing up

for the work are expected to spend at least 120 hours of time on it; hours to be arranged so that they do not conflict with the regular class work. Upon completion of the course students will be expected to pass an examination to the satisfaction of the Chief Surgeon. Failure to do so will count against them in their credits for hospital appointment; otherwise credit will be given by the University for work performed.

COURSE IN MILITARY MEDICINE

During 1917-18, 33 hours of work in Military Medicine will be required of medical students.

PATIENTS' FUND

The Trustees of the University have established a fund known as the "Patients' Fund," the income of which is used for the support of free beds. This fund, to which contributions of any size can be made at any time, originated from money received from former patients of Landon Hospital. Much of it has been given by grateful clinical patients.

SAN FRANCISCO HOSPITAL

At the present time the Medical School controls over one hundred beds in the new San Francisco Hospital, averaging about a thousand patients per year. This hospital, erected at an expense of two million dollars, is one of the finest and most complete structures of its kind in America. Possessing separate buildings for the care of contagious diseases and of tuberculosis, in addition to the main group for general surgical and medical cases, there is centered within the hospital grounds, convenient for teaching purposes, an abundance as well as a great variety of clinical material.

OUT-PATIENT DEPARTMENT

The lower floor of the Clinical and Laboratory Building is devoted entirely to the Surgical Out-patient Clinic and its various subdivisions; the second floor to the Medical Out-patient Clinic with its subdivisions; the three upper floors contain the Pathological Museum and the laboratories of Clinical Pathology, Dermatology, Experimental Medicine, Neurology, Pathology, Pediatrics, Pharmacology, Obstetrics and Gynecology, Serology, and Experimental Surgery. The laboratory of Clinical Pathology and the Out-patient Department are separated only by a short corridor from the clinical wards of the Hospital, so that both in- and out-patients are equally available for teaching purposes. About seventeen thousand new patients were received during the past year, with a total number of visits of about ninety-four thousand.

DENTAL CLINIC

connection with the Out-patient Department an Emergency Dental Clinic is maintained and is under the direction of Dr. Fred Wolfsohn.

HOSPITAL INTERNESHIPS

Twelve internes, a house officer, and an assistant house officer are appointed annually at the Lane Hospital. Six of these are Senior Internes and have a continuous service for one year with the option of renewal in any of the following divisions: Medicine, Pediatrics, Surgery, Obstetrics and Gynecology, or Actinography. Six Junior Internes, with a rotating service, are likewise appointed. In addition to their other services they are assigned in rotation to a two months' service in Psychiatry at the Napa State Hospital. Five of these are eligible for Senior Internships later. An Externe is also appointed for the Eye, Ear, Nose, and Throat Department. Six internships, including a rotating service and also two months at the Napa Hospital, and appointments as house officer and assistant house officer are also available in Stanford service at the San Francisco Hospital, as are also several other internships at other hospitals in the City and State.

LIBRARY FACILITIES

THE LEVI LANE MEDICAL LIBRARY, founded by the Directors of Cooper Medical College, as provided by the will of Mrs. Levi Cooper Lane, comprises over 42,000 volumes. The larger part of the library was obtained from the New York Academy of Medicine and represents their duplicate collection made up largely of books originally belonging to the well known Medical Library of the New York Hospital. About 100 periodicals are currently received, and the numerous files of bound volumes are practically complete.

Cards of current medical accessions are received from the Library of Congress and from the John Crerar Library in Chicago. These, with the catalogues of the Surgeon General's Library, facilitate borrowing books from three great libraries. Loans are also made to and from the University Library at Stanford, which contains about 200,000 volumes.

ADMISSION TO THE SCHOOL OF MEDICINE

Applicants for admission to the first five quarters in medicine should communicate with The Registrar, Stanford University, California; those desiring to enter the upper classes of the Medical School (i.e., from the sixth to the twelfth quarters), should communicate with The Dean, Stanford University Medical School, corner Sacramento and Webster streets, San Francisco, Cal.)

With the introduction of the Four-Quarter System, students may be able to reduce the total number of years spent on the combined pre-medical and medical curriculum by one year.

The State Law, however, requires that applicants for licensure show records of four medical courses of thirty-two weeks' duration, but not necessarily pursued continuously or consecutively, and that at least ten months shall have intervened between the beginning of any course and the beginning of the preceding course.

Students contemplating studying medicine elsewhere than at the Stanford Medical School are advised to write early in their undergraduate course to the Deans of the medical colleges which they may wish to enter, in order to learn the exact entrance requirements so that no time may be lost in transferring from one institution to another.

Three years of collegiate work in Stanford University (approximately 135 unit hours), or its equivalent as accepted by the Committee on Advanced Standing, is required for admission to the School of Medicine. This preparatory training must include at least one year of Chemistry, including Qualitative and Quantitative Analysis, one year of Physics, one year of Physiology or Biology, with laboratory work in each, and such a reading knowledge of French or German as shall be acceptable to the School of Medicine. It is recommended that both German and French be studied and that a lecture and laboratory course be taken in Psychology.

Beginning with 1918 three units of Organic Chemistry will be required for entrance to the Medical School. Owing to the late announcement of this fact special provision will be made for students who have failed to follow the advice of the Medical Faculty as given in previous announcements and have not included this subject in their pre-medical curriculum.

Candidates for admission to the School of Medicine are permitted to register with one condition, except in the eight hours of Chemistry as prescribed by the Association of American Medical Colleges. This condition must be removed before the beginning of the second year in medicine.

The State Law governing the practice of Medicine in California prescribes that every person before practicing Medicine or Surgery must produce satisfactory testimonials of good moral character and a diploma issued by some legally chartered medical school approved by the Board of Medical Examiners, the requirements of which school shall have been at the time of granting such diploma in no degree less than those prescribed by the law. The main provisions of this

law are that the applicants must show records of four medical courses of thirty-two weeks' duration, but not necessarily pursued continuously or consecutively, and that at least ten months shall have intervened between the beginning of any course and the beginning of the preceding course, following a preliminary preparation, at present of a high school course or specified equivalent and after January 1, 1919, in addition, a course which includes at least one year of work of college grade in each of the subjects of Physics, Chemistry, and Biology. The specified four years' medical course includes 4000 schedule hours, embracing the usual medical curriculum. In the course of study outlined the hours required are hours of actual work in the class room, laboratory, or hospital, and at least eighty per cent of actual attendance is required.

Graduates of the medical school are advised to take the examinations of the National Board of Medical Examiners, if possible. Several states already recognize the licentiates of the National Board and it is expected that before long many more states will do so. It seems likely therefore that within a reasonable number of years a licentiate of this Board will have the privilege of practicing medicine in all or nearly all the states of the Union.

PRE-CLINICAL STUDENTS

Students who have obtained 135 units credit including the pre-medical subjects, in any Department of the University, may register in medicine without relinquishing their registration in their Major Department. All prospective as well as registered medical students must also enroll in the Pre-clinical group. Students whose names begin with the letters A-F will enroll with the department of Anatomy, from G-M with the department of Bacteriology, and from N-Z with the department of Physiology. Medical students who are unable to complete both the requirements of major department and the first year in medicine by the end of their senior year, may nevertheless be eligible for the degree of A. B. in the Pre-clinical group. The work of these students will be supervised by the Committee on Academic Matters of the Medical School and on completion of the first year in medicine they will be recommended for the degree of Bachelor of Arts in the Pre-clinical group.

It is strongly advised that students obtain special training in some subject preparatory to medicine and broaden their foundation by devoting more than three years to this work. It is further advised that all prospective medical students acquire a reading knowledge of both French and German.

Students who have included in their course of study the subjects required for admission to the Medical School while retaining their registration in their Major Department as candidates for the degree of A. B., must also enroll in the School of Medicine during the last three quarter year (i. e. at the beginning of the tenth quarter in the university) and pay the fees of the School in order that this year may count as part of the four years' registration in Medicine as required by the law of the State and the five years' work required by the regulations of the University. Tuition fees are required for but four years of the medical course.

Students are particularly warned not to postpone their registration in medicine, and they must have paid all medical fees of the first five quarters in medicine before coming to San Francisco.

LIMITATION OF THE NUMBER OF STUDENTS

The accommodations of the Medical School at San Francisco render it inadvisable to admit more than 25 students to each class. It will therefore be necessary to restrict the number of students to 25 in each class, commencing with the sixth quarter. There are no restrictions in regard to entrance to the first five quarters in medicine at Stanford University, but all students entering the medical classes at Stanford University cannot be assured that they will be able to continue their medical studies at the University for more than five quarters.

Students once admitted to the sixth quarter may continue to graduation, provided scholarship and conduct are satisfactory, and that they present themselves for registration on the regularly appointed days. Places will not be held for such students after the regular registration days, except by special permission granted in advance by the Dean.

Students planning to continue their work at Stanford University after the first three quarters of registration in Medicine should notify the Dean in writing to that effect at as early a date as possible, and file a complete record of their preparatory, collegiate, and medical work with the Registrar before the end of the fifth quarter in Medicine. No one will be permitted to enroll in the fifth quarter in Medicine with less than 210 units of credit or with a condition in more than 5 units in any required subject, except by consent of the Dean, which must be confirmed by a special vote of the Faculty. Students must arrange their work at the University in such a way as to commence their studies in San Francisco in the Spring or Autumn quarters. This arrangement will permit a certain number of additional students each year to come to San Francisco besides the 25 mentioned above.

THE EIGHT YEARS' CURRICULUM

The combined eight years' curriculum—three years of college work and five years in medicine—leads to the degrees of Bachelor of Arts and Doctor of Medicine.

SPECIAL WORKERS

Physicians and others who are properly qualified, but not candidates for a degree, may be admitted to work in the School of Medicine with the permission of the Dean of the School and of the professor or professors concerned. Such persons shall be listed as Special Workers and pay such fees as are required by the Dean and the Executive Head of the Division concerned.

THE CURRICULUM IN MEDICINE

The required period of study for the degree of Doctor of Medicine is twelve quarters plus the interne year. The work of the first five quarters is given at Stanford University and is devoted to anatomy, bacteriology, chemistry, embryology, histology, neurology, experimental pathology, physical diagnosis, and physiology. The next seven quarters are devoted to work in the pharmacological, pathological, and clinical laboratories and in the hospital wards and the outpatient department in San Francisco. The last year is spent in hospital work.

In order to correlate the work of some of the Divisions and to facilitate research in others, all courses in Medicine, except those in anatomy, bacteriology, chemistry, and physiology, are given in San Francisco. By reducing the number of required hours to approximately the number decided upon by the Association of American Medical Colleges, the student's opportunity for taking optional and elective courses has been increased and time obtained for thesis work.

REQUIRED INTERNE YEAR

All students are required to take a fifth practical year in Medicine before receiving the degree of Doctor of Medicine. Arrangements may be made so that the fifth year may be spent as worker in a laboratory. No tuition fee is required of internes.

FEES

The tuition fees of the Medical Department are \$150 per annum for four years, payable in installments of \$50 each quarter; \$5 per quarter for the first five quarters, covering charges for material; and such other deposits to cover breakage or loss of apparatus and materials as may be required in any department or division, these deposits being returnable, less charges for breakage, loss, or wear and tear of apparatus, or

for materials used. The total deposits for this purpose may vary from \$10 to \$20 per annum.

MICROSCOPES AND INSTRUMENTS

By action of the Medical Faculty taken May 12, 1912, students will be expected to supply themselves with microscopes. The Medical School offers the use of a microscope for the college term, not including the summer vacation, to students who do not possess instruments of their own, on deposit of \$10 and a rental of two dollars per quarter. This deposit, less the cost of necessary repairs, is refunded on return of the microscope. In the laboratories of physiology and histology and in embryology microscopes are furnished free.

All students are expected to provide themselves with a satisfactory blood counter for their own use, and such other pieces of individual apparatus as are essential to the required work.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE

The candidate for the degree of Doctor of Medicine must, according to the laws of the State, have attained the age of twenty-one years and have attended a medical college of recognized standing for four years. He must further have fulfilled the entrance requirements of the Medical School of Stanford University before enrolling as a medical student, have satisfactorily completed the required curriculum, passed all examinations, paid in full the required fees, and have spent the last three quarters preceding the interne year at the University. Physicians who have already received the degree of Doctor of Medicine are not received as candidates for this degree by the Stanford Medical School.

REGULATIONS CONCERNING THESES

A thesis based as much as feasible upon research work will be required of each student. If the thesis is not completed previously, four curriculum hours in each of the last three quarters are to be devoted to its preparation under the supervision of one of the Heads of Divisions.

Students of Medicine may select the Division in which they desire to write their thesis, and if properly qualified may begin work on the same at any time before the beginning of the second semester of their fourth year in Medicine. The topic for investigation or the subject matter for study shall be chosen with the advice and consent of the Executive Head of the Division concerned, and no change of subject shall be made without the consent of the Executive under whose direction the work was begun. Except by special permission theses must be completed by the end of the fourth year in medicine.

ADVANCED DEGREES IN THE MEDICAL DEPARTMENT

The Divisions of the Medical Department are considered as equivalent to other departments of the University in respect to candidacy and requirements for the degrees of Master of Arts and Doctor of Philosophy, and all the foregoing regulations apply to these divisions and division faculties as to departments and department faculties, with the following modifications and limitations:

1. Candidates for these degrees must have received the degree of A. B. at Stanford, or an equivalent degree elsewhere, and must have completed all requirements for admission to the Department of Medicine, and such other requirements as each division faculty may prescribe.
2. Time spent in candidacy for the degree of Master of Arts or Doctor of Philosophy will not be counted toward the degree of Doctor of Medicine.
3. Candidates for these degrees in the divisions of Medicine, Surgery, and Obstetrics and Gynecology, must have received the degree of Doctor of Medicine.

SUMMER GRADUATE MEDICAL COURSE

JULY 9 TO AUGUST 17, 1917

The Trustees and the Medical Faculty of Stanford University in 1914 inaugurated a Summer Graduate Medical School with the object of making available to the medical profession during the summer months the clinical, laboratory, and hospital facilities of the Medical School. In pursuance of this plan the fourth annual announcement of the Summer Graduate Medical Course is herewith presented. The session will extend for six weeks, from July 9 to August 17. The classes will be given in San Francisco in the Medical School Building, corner Sacramento and Webster streets; Lane Hospital, corner Clay and Webster streets; San Francisco Hospital, 22nd street and Potrero avenue; and the Isolation Hospital, Army and de Haro streets.

The Lane Medical Library of Stanford University of 40,000 volumes, situated just across the street from the Medical School Building, is open to all members of the Summer School.

The courses are designed primarily for the benefit of the profession, and are open to all licensed physicians or to graduates of recognized medical schools. By special arrangement, medical students may be permitted to attend if they possess the necessary preparation. No formal certificates or University credits will be given for attendance at these courses, but a statement in the form of a letter from the Dean's

Office will be provided if desired. The fees have been arranged according to the cost of materials and the time required in the preparation of the work. As many courses as desired may be taken, the total fee being the sum of the fees for the individual courses taken, with \$150 as the maximum fee. Students, however, are advised to concentrate their efforts upon one or two courses rather than to attempt to cover too wide a field. In the laboratory courses a deposit of \$5 is required to cover breakage or loss, or rental of microscope, subject to refund of the balance at the end of the course. Registration should be arranged for on or before July 9, and all correspondence should be addressed to the Office of the Dean, Stanford University Medical School, corner Sacramento and Webster streets, San Francisco, Cal.

MEDICAL GROUP

1. *Clinical Medicine.* (HEWLETT) Daily, 10-12

The class is limited to twelve. The work will be given in the medical wards of the Lane and San Francisco Hospitals. The hour from ten to eleven will be spent in the personal examination of patients by those taking the course, two physicians being assigned to each patient. During the following hour two or more of the patients thus examined will be demonstrated before the class as a whole. Special attention will be given to physical diagnosis, to cardiac irregularities, to functional kidney tests and to the interpretation of laboratory and radiographic findings in diagnosis. Those desiring practical X-ray work, however, should register for the course listed below. Fee, \$35.

2. *Roentgenography and Roentgen Therapy.* (BOARDMAN)

Daily, except Saturdays, 9-10

The class is limited to six. The work will cover the field of X-Ray diagnosis and treatment, especial attention being given to the study of gastro-intestinal diseases, with practical work in fluoroscopy, radiography and radiotherapy. Fee, \$35.

3. *Cutaneous Medicine and Syphilis.* (ALDERSON)

Special courses in cutaneous medicine and syphilis may be arranged by communicating with Dr. Alderson before May 30, 1917.

4. *Pediatrics.* (FABER)

Daily, 9-10:30

Work to be given to a class of six. The course will consist of clinical work in the Children's Clinic and in the Children's Ward of Lane Hospital. Opportunity will be given to acquire the simpler laboratory methods of milk and stool analysis. Fee, \$25.

SURGICAL GROUP

5. *Clinical Surgery.* (ELOESSER, COWAN)

T, 10-12; Th, 8:30-12, Lane Hospital;
MWF, 8:30-10:30, San Francisco Hospital.

The course will consist of daily ward visits with bedside demonstrations; at the San Francisco Hospital the greater part of the time will be devoted to surgery of the extremities, fractures and lesions of the bones and joints; special attention will be paid to the relations of the various cases to *accident insurance*. At the Lane Hospital especial attention will be given to abdominal conditions. There will be one or two operating days a week. Fee, \$35.

6. *Anatomy.* (BLAISDELL)

Experimental fractures on the cadaver and laboratory technique. The laboratory will be open and material will be available for those desiring work in dissection (including the brain), histology, laboratory technique, surgical anatomy and the study of fractures experimentally produced on the cadaver. Hours and fee to be arranged.

7. *Orthopedic Surgery.* (ELY, LANGNECKER)

A clinical course in orthopedic surgery in the Stanford Clinic and Lane Hospital. Five times weekly. Besides the routine work of the Orthopedic Department of the Stanford Clinic, special attention will be given to the affections of the bones and joints, conditions resulting from faulty posture, the correction of deformities and paralyses by the most modern and efficient methods, including the fitting of braces and supports, mechanical therapy and physical therapy. To this is added a weekly clinic at Lane Hospital by Dr. Ely. Fee, \$35.

8. *Genito-Urinary Surgery.* (RIGDON)

MWF, 8:30-10

The class is limited to five. The work will consist of clinical studies and demonstrations of cases, and of operative clinics. The members of the class will be expected to work in the out-patient department and in the clinic wards of Lane Hospital. Fee, \$35.

9. *Clinical Ophthalmology.* (BARKAN)

MTWThF, 1:30-3:30

The class is limited to ten. The work will consist of a clinical lecture from 1:30 to 2:30, covering the principles of refraction, diagnosis and treatment of external diseases, review of fundus conditions, relation of eye lesions to general medicine and operative methods; the hour from 2:30 to 3:30 to be spent in practical work under the instructor's supervision. Operative clinic at 2:30 on Tuesdays. Fee, \$35.

10. *Otology and Laryngology.* (McNAUGHT)

MTWThF, 3-4

The work will include general clinical studies and demonstrations of

routine cases, with especial consideration of the physiology and pathology of the middle ear and labyrinth, and the surgical anatomy of the nose and throat, with specimens and operative demonstrations. Members of the class will have the privilege of following the routine handling of cases in the out-patient department and in the clinic wards of the Lane Hospital. Fee, \$35.

OBSTETRICS AND GYNÉCOLOGY

11. *Practical Obstetrics*. (MOORE) MF, 2-3; with two weeks daily service, during which time students are to live in the clinic and devote their entire time to Obstetrics. The work will consist of routine obstetrical work with talks and demonstrations on pelvic measurements, antepartum examinations, confinement in patients' homes and in hospitals, postpartum care and examination of patients six weeks after delivery. Fee, \$25.

12. *Gynecology*. (SPALDING) Outpatient Department, daily, 10-11; Operating Room, TF, 2; Laboratory, Th, 2-4
The class is limited to six. The work will include practical instruction in gynecological diagnosis, clinical studies and demonstrations of cases, medical treatment, operative demonstrations, and the study of gross and microscopical specimens of gynecological material. Fee, \$35.

13. *Cystoscopy*. (BEASLEY) MWF, 8-9
The class is limited to two sections of not more than three students each; nine periods per section. The work will include demonstrations and practical instruction in cystoscopy, urethral catheterization, and methods of estimating renal function. Fee, \$35.

14. *Anaesthesia*. (PALMER)
The class is limited to six. The work will consist of personal instruction on the various anesthetics. The members of the class will have the privilege of administering the routine clinic anesthetics under the direction of Dr. Palmer. Fee, \$35.

15. *Pathology*. (Clinical Pathological Conferences) (OPHÜLS)
The work will consist of the presentation of specimens obtained at the clinical autopsies in the course of the week with a brief discussion of the clinical data. Two hours, once a week. If desired, the material will be at the disposal of the members of the class for more intensive study in the laboratory. On request, special subjects will be taken up and illustrated by demonstrations of museum specimens and microscopical slides. Time to be arranged at the convenience of those taking the course. Fee, \$25.

PRE-NURSING COURSE

The University intends to offer a combined course consisting of three years of university work at Stanford and two years in nursing at the University Hospital, San Francisco, which will lead to the degree of *Bachelor of Arts* and also that of *Graduate Nurse*. This course is designed particularly for those who wish to prepare themselves for administrative, teaching, social service, or public health work. As tentatively outlined, the prescribed subjects at the University would be as follows:

Modern Language	15	units
Chemistry	9-13	"
Physics	5-10	"
Zoology or Botany	5-10	"
Anatomy	10	"
Physiology	10	"
Bacteriology	4-6	"

As electives the following subjects would be recommended to prospective nurses: Physiological Chemistry, English, Education, Psychology, Economics, and History. Students would have to complete 135 units of work at the University, and it is expected that they will be able to finish the theoretical and nursing work required in the city in two years.

Students intending to take this course should confer with Professor C. S. STOLTENBERG, Stanford University, and with Miss C. E. HOGUE, Superintendent of Nurses, Lane Hospital, San Francisco. Prospective students will be required to take their probationary period as nurses (three months) early in the course, while they are still at the University. This work can be arranged for during the summer quarter.

THE CURRICULUM

FIRST QUARTER (Autumn)	Hours per week
Physiological Chemistry (17 and L).....	17
Histology (Anatomy 1)	18
	—
	35
SECOND QUARTER (Winter)	
Physiology 3 (Muscle, Nerve, Central Nervous System).....	9
Embryology (Zool.)	9
Anatomy (Dissection, etc.; 2, 3, 4, 5).....	15
	—
	33

Office will be provided if desired. The fees have been arranged according to the cost of materials and the time required in the preparation of the work. As many courses as desired may be taken, the total fee being the sum of the fees for the individual courses taken, with \$150 as the maximum fee. Students, however, are advised to concentrate their efforts upon one or two courses rather than to attempt to cover too wide a field. In the laboratory courses a deposit of \$5 is required to cover breakage or loss, or rental of microscope, subject to refund of the balance at the end of the course. Registration should be arranged for on or before July 9, and all correspondence should be addressed to the Office of the Dean, Stanford University Medical School, corner Sacramento and Webster streets, San Francisco, Cal.

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10. *Otology and Laryngology.* (McNAUGHT)

MTWThF, 3-4

The work will include general clinical studies and demonstrations of

Obstetrics and Gynecology 13 (Gyn. Conference)	2
Obstetrics and Gynecology 14 (Gyn. Conference)	2
Military Medicine	3
Thesis	12
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	94½-95½

FIFTH YEAR (Hospital Year)

After completion Clinical Examinations in Medicine, Surgery and Obstetrics.

I. DIVISION OF ANATOMY

ARTHUR WILLIAM MEYER, FRANK MACE MCFARLAND, Professors.

CLARA S. STOLTENBERG, Associate Professor.

ELBERT CLARK, Acting Associate Professor.

EDGAR DAVIDSON CONGDON, Assistant Professor.

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8 units (Total—198 hours.) (MCFARLAND)

Autumn quarter, Lec. MWF 9; Lab. MWF 10-12, TTh 9-12, W 1:05-4:05. Repeated in spring quarter, Lec. MWF 11; Lab. MTWThF 1:05-4:05.

2. Osteology.—Students will be expected to familiarize themselves thoroughly on their own initiative, with the surface anatomy of the bones of the skeleton. This individual work will be supplemented by the laboratory study of special aspects of the subject under the supervision of instructors. Not given as a separate course. Credit is included in the courses in dissection of which osteology forms a part.

(CONGDON) Winter quarter, M 9-12; spring quarter, M 1:05-4:05.

3-4-5. Dissection of (3) the Head, Neck, and Thorax; (4) the Upper Extremity; (5) the Abdomen and Lower Extremity.—These courses are given simultaneously throughout the year and may be begun at any time. No one will be assigned to less than one of the

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THE CURRICULUM

FIRST QUARTER (Autumn)	Hours per week
Physiological Chemistry (17 and L).....	17
Histology (Anatomy 1)	18
	—
	35
SECOND QUARTER (Winter)	
Physiology 3 (Muscle, Nerve, Central Nervous System).....	9
Embryology (Zool.)	9
Anatomy (Dissection, etc.; 2, 3, 4, 5).....	15
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	33

THIRD QUARTER (Spring)

Physiology 4 (Circulation, Respiration, Digestion, and Metabolism)	9
Bacteriology 1 (Introductory)	6
Anatomy (Dissection, etc.; 2, 3, 4, 5).....	15
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	30

FOURTH QUARTER (Autumn)

Bacteriology 2 (Pathogenic bacteria)	10
Anatomy (Dissection, etc., 2, 3, 4, 5).....	12
Neurology (Anatomy 6)	9
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	31

FIFTH QUARTER (Winter)

Experimental Pathology (Bact. & Exp. Path. 4).....	9
Physiology 5 (Sense Organs)	9
Physical Diagnosis	4
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	22

SIXTH QUARTER

Medicine 1 (Physical Diagnosis)	4
Medicine 2 (Clinical Pathology)	4
Pharmacology and Materia Medica 1 (a).....	9
Pathology 1 (General)	6
Surgery 1 (Principles)	4½
Surgery 2 (Fractures and Dislocations)	2
Surgery 3 (Surgical Anatomy)	1½
Surgery 4 (Surgical Diseases of Extremities)	2
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	33

THIRD YEAR

Hygiene 1	1
Medicine 3 (Diseases of Thoracic Organs).....	4
Medicine 4 (Diseases of Digestive Tract).....	4
Medicine 5 (Infectious Diseases)	3½
Medicine 6 (Diseases of Kidneys, Blood and Met.).....	3
Medicine 11 (Physical Therapeutics)	2
Medicine 13 (Practical Therapeutics and Prescr. Wr.).....	3
Medicine 18 (Pediatrics Recitation)	4
Medicine 19 (Infant Feeding, etc.)	2
Medicine 20 (Contagious Diseases)	2

Medicine 23 (Neurology)	4
Medicine Electives	14
Pharmacology and Materia Medica 1 (b)	5
Pathology 3 (Special)	12
Surgery 5 (Diseases of Abdomen)	2
Surgery 6 (Diseases of Head and Neck)	2
Surgery 7 (Diseases of Thorax)	1
Surgery 8 (Set Clinic)	6
Surgery 9 (Outpatient Clinic)	4
Surgery 10 (Ward, Lane Hospital)	2
Surgery 11 (Laboratory) (Tumors)	3
Surgery 12 (Lab., General Surgical Pathology)	6
Surgery 13 (Preliminary Ophthalmology)	1
Obstetrics and Gynecology 1 (Laboratory Course)	4
Obstetrics and Gynecology 2 (Obstetrics Lect.)	2
Obstetrics and Gynecology 3 (Obstetrics Lect.)	2
Obstetrics and Gynecology 4 (Obstetrics Lect.)	2
Obstetrics and Gynecology 5 (Ward Rounds)	1

101½

FOURTH YEAR

Hygiene 1	2
Medicine 25 (Ward, S. F. Hospital)	7
Medicine 31 (Dermatology)	2
Medicine 32 (Pediatrics and Dermatology)	6
Medicine 34 (Psychiatry)	4½
Medicine 35 (History of Medicine)	1
Medicine 36 (Jurisprudence)	1
Medicine Electives	11
Surgery 14 (Clinic, Lane Hospital) }	10-11
Surgery 15 (Clinic, S. F. Hospital) }	
Surgery 19 (Orthopedic Surgery)	3
Surgery 20 (Genito-Urinary)	5
Surgery 21 (Ophthalmology)	5
Surgery 22 (Otology, Rhinology and Laryngology)	6
Surgery Electives	3
Obstetrics and Gynecology 6 (Gyn. and Manikin Ex.)	2
Obstetrics and Gynecology 7 (Outpatient Obs.)	4
Obstetrics and Gynecology 9 (Ward Rounds)	1
Obstetrics and Gynecology 10 (Women's Clinic)	1
Obstetrics and Gynecology 11 or 12 (Operating R.)	1

Obstetrics and Gynecology 13 (Gyn. Conference)	2
Obstetrics and Gynecology 14 (Gyn. Conference)	2
Military Medicine	3
Thesis	12
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After completion Clinical Examinations in Medicine, Surgery and Obstetrics.

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V. DIVISION OF MEDICINE

ALBION WALTER HEWLETT (Executive), Professor.

WILLIAM FITCH CHENEY, ANDREW WILLIAM HOISHOLT, LANGLEY PORTER, Clinical Professors.

THOMAS ADDIS, Associate Professor.

HARRY EVERETT ALDERSON, HAROLD PHILLIPS HILL, WALTER FRANK SCHALLER, Associate Clinical Professors.

WALTER WHITNEY BOARDMAN, ERNEST CHARLES DICKSON, HAROLD KNIEST FABER, HENRY HERBERT YERINGTON, Assistant Professors.

FLORENCE MABEL HOLSCLOW, HARRY REEVES OLIVER, JULIAN MAST WOLFSOHN, Assistant Clinical Professors.

GEORGE DE FOREST BARNETT, Instructor.

WILLIAM REDWOOD PRICE CLARK, THOMAS GEORGE INMAN, ARTHUR ALOYSIUS O'NEILL, ALFRED CUMMINGS REED, CHESTER DURBIN SEWALL, ROLAND BEATTY TUPPER, Clinical Instructors.

WILLIAM LOUIS ADAMS, MILLCENT COSGRAVE, AMELIA L. GATES, ANTHONY HUFFAKER, CHARLES NELSON LEACH, HENRY GEORGE MEHRTENS, PHILIP HALE PIERSON, JAY MARION READ, PAUL WHELAN, Assistants.

ARTHUR JOHN RITTER, Lecturer on Mental Deficiency.

ROBERT EUGENE BERING, Lecturer on Drug Addictions.

SUBDIVISIONS

PEDIATRICS	JURISPRUDENCE	ACTINOGRAPHY
NEUROLOGY	DERMATOLOGY AND SYPHILIS	TROPICAL MEDICINE
PSYCHIATRY	ELECTROTHERAPY	DIETETICS

TUBERCULOSIS

Instruction in the Division of Medicine normally commences in the fifth quarter of medical registration, at which time the course in Physical Diagnosis is started at Palo Alto. During the sixth quarter this course is finished in San Francisco, and a course in Clinical Pathology (Medicine 2) is also given. These courses are pre-requisite for most other courses in this Division (except Medicine 5, 8, 9, 10, 11, 15, and 16) and on their completion the student is admitted to third year standing in the Division of Medicine.

Students of third year standing will be admitted to fourth year standing (1) after having completed the following prescribed courses: Medicine 3, 4, 5, 6, 11, 13, 18, 19, 20, 23; (2) after having completed in addition: (a) at least 12 hours elected from the following courses: Medicine 7, 8, 9, 10, 12, 14, 15, 16, and 17; (b) and at least 2 hours

elected from the following: Medicine 21 and 22; (3) after having passed final examinations in Internal Medicine and in Pediatrics as a whole, as well as in the preliminary course of Neurology.

Before graduation, students of fourth year standing are required: (1) to complete the following prescribed courses: Medicine 25, 31, 32, 34, 35, 36; (2) to have completed in addition at least (a) 9 hours elected from the following courses: Medicine 17, 25, 26, 27, and 28; (b) 2 hours elected from the following courses: Medicine 29 and 30; (3) to have passed final examinations in Internal Medicine, Neurology, Diseases of Children, and Dermatology.

Deviations from the above general plan of work will be permitted only after obtaining permission of the instructors involved and of the Head of the Division of Medicine.

COURSES FOR SECOND YEAR MEDICAL STUDENTS

1. Physical Diagnosis.—An introductory course in Physical Diagnosis will be offered during the winter quarter at Stanford University, based mainly upon a study of normal subjects. A continuation of this course based mainly upon the study of those presenting physical abnormalities will be offered during the spring quarter in San Francisco. Students coming to San Francisco in the autumn quarter may take a combination of these courses at that time.

4 hours, winter quarter at Stanford University (STOLZ) followed by
4 hours, spring quarter at San Francisco (ADDIS) (Total—88 hours)

T 9-11; S 10-12
or 7½ hours, autumn quarter at San Francisco (ADDIS) (Total—
82 hours) TTh 9-11; M 9-10:30; S 10-12

2. Clinical Pathology.—Lectures and laboratory work. The usual methods of examining the urine, blood, sputum, gastric contents, feces and spinal fluid are carried out by the student and the significance of abnormalities studied.

4 hours, autumn or spring quarter, at San Francisco (Total—44 hours) (BARNETT) F 8:30-10:30; S 8-10

COURSES FOR THIRD YEAR MEDICAL STUDENTS

3. Diseases of the Thoracic Organs.—Clinics and recitations. Limited to 12 students.

4 hours, autumn, winter, or summer quarter (Total—44 hours)
(BARNETT, DICKSON or HEWLETT) MTh 9-11

4. Diseases of the Digestive Tract.—Clinics and recitations. Limited to 12 students.

4 hours, autumn, winter, or summer quarter (Total—44 hours)
(CHENEY, BOARDMAN or SEWALL) MTh 9-11

5. **Infectious Diseases.**—Clinics and recitations.
 $3\frac{1}{2}$ hours, spring quarter (Total—38 hours) (DICKSON)
M 9-10:30, Th 9-11
6. **Diseases of the Kidneys, the Blood, and of Metabolism.**—Clinics and recitations.
3 hours, autumn quarter (Total—33 hours) (ADDIS)
T 9-10, S 8-10
7. **History Taking.**—Practice in History Taking in the outpatient department with demonstration of patients. Course limited to groups of four students, but more than one group may be taken if hours can be arranged. (Elective)
3 hours, any quarter (Total—33 hours) (By arrangement)
(DICKSON, SEWALL, REED) W 10-12, MTh 9-11, F 10-12
8. **Tropical Diseases.**—Clinics and recitations. (Elective).
2 hours, spring quarter (Total—22 hours) (REED)
M 11-12, S 9-10
9. **Diseases of the Endocrine Glands.**—Clinics and recitations. (Elective).
1 hour, spring quarter (Total—11 hours) (WOLFSOHN) T 4-5
10. **Experimental Medicine.**—Discussions of selected topics dealing with the functional pathology of internal diseases. (Elective).
3 hours, autumn quarter (Total—33 hours) (HEWLETT, ADDIS, DICKSON, BOARDMAN, BARNETT) W 2-3:30, Th 4-5:30
11. **Physical Therapeutics.**—Lectures and demonstrations of various methods other than the use of drugs that are employed in the treatment of disease; including hydrotherapy, mechanotherapy, etc.
2 hours, spring quarter (Total—22 hours) (BARNETT) MT 2-3
12. **Dietetics.**—Lectures and recitations. (Elective).
3 hours, spring quarter (Total—33 hours) (ADDIS, BOARDMAN)
MTh 4-5, F 3-4
13. **Practical Therapeutics and Prescription Writing.**
3 hours, winter quarter (Total—33 hours) (HEWLETT) M 2-3, T 2-4
14. **Roentgenography.**—Practical instruction in plate interpretation. (Elective).
2 hours, winter quarter (Total—22 hours) (BOARDMAN)
T 1-2, Th 8-9
15. **Serology.**—Practical course in Serology and Immunology with particular study of the Wassermann test. (Elective).
2 hours, spring quarter (Total—22 hours) (OLIVER) F 1-3

16. Clinical Bacteriology.—Practice in the examination of throat cultures, in the technique of isolation of organisms from the blood, stools, etc., and in the preparation of vaccines. (Elective). Hours to be arranged. (DICKSON)

17. Set Clinic in Medicine.—Demonstration of patients from the ward and outpatient services of Lane Hospital. (Elective).

1 hour, any quarter (Total—11 hours) (HEWLETT, BOARDMAN)

18. Pediatrics: Recitation.

T 10-11

2 hours each, autumn and winter quarters (Total—44 hours)

(FABER, YERINGTON) M 11-12, T 8-9

19. Infant Feeding, and Formula Preparation.—Practical course. Limited to eight students.

2 hours, any quarter (Total—22 hours)

(YERINGTON, HOLSCLOW) F 10-12

20. Contagious Diseases (Isolation Hospital).—Limited to eight students.

2 hours, any quarter (Total—22 hours) (O'NEILL) W 8:30-10:30

21. Lectures on Pediatrics.—During the autumn quarter on Contagious Diseases, during the winter quarter on Mental Deficiency, and during the spring quarter on selected topics. (Elective).

1 hour, autumn, winter, or spring quarter (Total—11 hours)

(O'NEILL, RITTER, PORTER, and others) Th 1-2

22. Set Clinic in Pediatrics.—Demonstration of patients from the Children's Ward and outpatient services of Lane Hospital. (Elective).

1 hour, each quarter (Total—11 hours)

(PORTER, FABER, YERINGTON) T 11-12

23. Neurology.—Clinics, lectures and recitations; four units in all.

2 hours, winter and spring quarters (Total—44 hours)

(SCHALLER) TF 9-10

COURSES FOR FOURTH YEAR MEDICAL STUDENTS

24. Ward Work—Lane Hospital.—Limited to eight students. (Elective). Students electing this course are required to elect Medicine 17 also.

7 hours, any quarter (Total—77 hours) (HEWLETT, CHENEY,

BOARDMAN, DICKSON) T 9-10, ThF 9-11, S 10-12

25. Ward Work and Clinics—San Francisco Hospital.—Limited to ten students. (One quarter is required; a second quarter may be elected).

7 hours, autumn, winter, or spring quarter (Total—77 hours)

(HILL) T 9-11:30, WTh 9-10:30, S 9-10:30

6. Outpatient Work in Internal Medicine.—Limited to two students. (Elective).

4 to 6 hours, any quarter (Total—44 to 66 hours)

(DICKSON, REED, SEWALL) ThF 9-11, S 10-12

7. Outpatient Work in Tuberculosis.—Limited to two students. (Elective).

2 hours, any quarter (Total—22 hours) (CLARK) F 9-11

8. Tuberculosis Clinic—San Francisco Hospital.—(Elective).

1 hour, autumn, winter, or spring quarter (Total—11 hours)

(CLARK) Th 10:30-11:30

9. Neurology Clinic—San Francisco Hospital.—(Elective).

2 hours, autumn, winter, or spring quarter (Total—22 hours)

(WOLFSOHN) WS 10:30-11:30

10. Outpatient Work in Neurology.—Limited to two students. (Elective).

6 hours, any quarter (Total—66 hours) (SCHALLER)

Th 9-11, F 9-11, S 10-12

11. Dermatology.—Lectures and clinics.

2 hours, autumn or winter quarter (Total—22 hours)

(ALDERSON) M 10:30-11:30, T 11-12

12. Outpatient and Ward Work in Pediatrics and Dermatology.—Practical course. The student spends half the quarter in Pediatrics and the other half in Dermatology. Limited to eight students.

6 hours, any quarter (Total—66 hours)

(ALDERSON, PORTER, FABER, YERINGTON) WThS 10-12

13. Roentgenography.—Practical course in fluoroscopy and in the technique of Roentgen Ray examination. Limited to 2 students. (Elective).

2 hours, autumn or winter quarter (Total—22 hours)

(BOARDMAN) T 8-10

14. Psychiatry.—A weekly lecture preceded by a clinic. 4½ hours required in all.

1½ hours, autumn, winter, and spring quarters (Total—50 hours)

(HOISHOLT) M 1:30-3

15. History of Medicine.—In association with other Divisions a weekly lecture or recitation will be held. The aim will be to have each Division present that portion of the history of medicine in which

elected from the following: Medicine 21 and 22; (3) after having passed final examinations in Internal Medicine and in Pediatrics as a whole, as well as in the preliminary course of Neurology.

Before graduation, students of fourth year standing are required: (1) to complete the following prescribed courses: Medicine 25, 31, 32, 34, 35, 36; (2) to have completed in addition at least (a) 9 hours elected from the following courses: Medicine 17, 25, 26, 27, and 28; (b) 2 hours elected from the following courses: Medicine 29 and 30; (3) to have passed final examinations in Internal Medicine, Neurology, Diseases of Children, and Dermatology.

Deviations from the above general plan of work will be permitted only after obtaining permission of the instructors involved and of the Head of the Division of Medicine.

COURSES FOR SECOND YEAR MEDICAL STUDENTS

1. Physical Diagnosis.—An introductory course in Physical Diagnosis will be offered during the winter quarter at Stanford University, based mainly upon a study of normal subjects. A continuation of this course based mainly upon the study of those presenting physical abnormalities will be offered during the spring quarter in San Francisco. Students coming to San Francisco in the autumn quarter may take a combination of these courses at that time.

4 hours, winter quarter at Stanford University (STOLZ) followed by

4 hours, spring quarter at San Francisco (ADDIS) (Total—88 hours)

T 9-11; S 10-11

or 7½ hours, autumn quarter at San Francisco (ADDIS) (Total—82 hours)

TTh 9-11; M 9-10:30; S 10-11

2. Clinical Pathology.—Lectures and laboratory work. The usual methods of examining the urine, blood, sputum, gastric contents, feces, and spinal fluid are carried out by the student and the significance of abnormalities studied.

4 hours, autumn or spring quarter, at San Francisco (Total—8 hours) (BARNETT)

F 8:30-10:30; S 8-9

COURSES FOR THIRD YEAR MEDICAL STUDENTS

3. Diseases of the Thoracic Organs.—Clinics and recitations. Limited to 12 students.

4 hours, autumn, winter, or summer quarter (Total—44 hours) (BARNETT, DICKSON or HEWLETT) MTh 9-11

4. Diseases of the Digestive Tract.—Clinics and recitations. Limited to 12 students.

4 hours, autumn, winter, or summer quarter (Total—44 hours) (CHENEY, BOARDMAN or SEWALL) MTh 9-11

5. **Infectious Diseases.**—Clinics and recitations.
 3½ hours, spring quarter (Total—38 hours) (DICKSON)
 M 9-10:30, Th 9-11
6. **Diseases of the Kidneys, the Blood, and of Metabolism.**—Clinics and recitations.
 3 hours, autumn quarter (Total—33 hours) (ADDIS)
 T 9-10, S 8-10
7. **History Taking.**—Practice in History Taking in the outpatient department with demonstration of patients. Course limited to groups of four students, but more than one group may be taken if hours can be arranged. (Elective)
 3 hours, any quarter (Total—33 hours) (By arrangement)
 (DICKSON, SEWALL, REED) W 10-12, MTh 9-11, F 10-12
8. **Tropical Diseases.**—Clinics and recitations. (Elective).
 2 hours, spring quarter (Total—22 hours) (REED)
 M 11-12, S 9-10
9. **Diseases of the Endocrine Glands.**—Clinics and recitations. (Elective).
 1 hour, spring quarter (Total—11 hours) (WOLFSOHN) T 4-5
10. **Experimental Medicine.**—Discussions of selected topics dealing with the functional pathology of internal diseases. (Elective).
 3 hours, autumn quarter (Total—33 hours) (HEWLETT, ADDIS, DICKSON, BOARDMAN, BARNETT) W 2-3:30, Th 4-5:30
11. **Physical Therapeutics.**—Lectures and demonstrations of various methods other than the use of drugs that are employed in the treatment of disease; including hydrotherapy, mechanotherapy, etc.
 2 hours, spring quarter (Total—22 hours) (BARNETT) MT 2-3
12. **Dietetics.**—Lectures and recitations. (Elective).
 3 hours, spring quarter (Total—33 hours) (ADDIS, BOARDMAN)
 MTh 4-5, F 3-4
13. **Practical Therapeutics and Prescription Writing.**
 3 hours, winter quarter (Total—33 hours) (HEWLETT) M 2-3, T 2-4
14. **Roentgenography.**—Practical instruction in plate interpretation. (Elective).
 2 hours, winter quarter (Total—22 hours) (BOARDMAN)
 T 1-2, Th 8-9
15. **Serology.**—Practical course in Serology and Immunology with particular study of the Wassermann test. (Elective).
 2 hours, spring quarter (Total—22 hours) (OLIVER) F 1-3

10. Women's Clinic.—For instruction in the taking of obstetrical histories, and in making antepartum and postpartum examinations. Sections limited to 2 students. (Four times a week for three weeks.)

1 hour, any quarter (Total—12 hours)

(STEPHENSON, MOORE) WThFS 11-12

11. Operating Room.—Operative clinics in gynecology are held throughout the year on Tuesday and Friday afternoons by Dr. Spalding and on Wednesday mornings by Dr. Stephenson. On Friday afternoons students are instructed in pelvic diagnosis and assist at times in operations. Each student must take a patient's history, write up the operation, note the post-operative condition, follow the patient until she returns to the clinic, review the literature for the past year on the condition treated, and hand in a report for distribution to the class. Limited to 10 students.

1 hour, any quarter (Total—11 hours) (SPALDING) F 2-3

(Students may choose between the above and course 12. Only one of these courses required.)

12. San Francisco Hospital.—Operative clinics in gynecology are held on Tuesday mornings from August 1st to February 1st by Doctor Gibbons, and from February 1st to August 1st by Dr. Girard. On days on which there are no operations, students are instructed in the obstetrical and gynecological wards. Clinical papers are required from students similar to course 11. Limited to five students.

1 hour, any quarter (Total—11 hours) (GIBBONS, GIRARD) T 8-9

13. Conference Course in Gynecology.—Case histories, pathological specimens and lantern slides are used in class discussions of gynecological ailments. The infectious and non-malignant tumors of the genital tract are covered in part in this course.

2 hours, autumn quarter (Total—22 hours) (SPALDING) MW 3-4

14. Conference Course in Gynecology.—Case histories, pathological specimens and lantern slides are used in class discussions of gynecological ailments. The lacerations of the genital tract, sterility, and the malignant tumors of the uterus and ovaries are discussed.

2 hours, winter or summer quarter (Total—22 hours)

(SPALDING) MW 3-4

15. Special Courses.—Work will be arranged in the laboratory or in the clinic to meet the needs of special workers.

(SPALDING and staff)

VII. DIVISION OF PATHOLOGY

WILLIAM OPHÜLS, Professor.

———, Assistant Professor.

ELMER WILLIAM SMITH, Instructor.

(The following courses in Pathology are required of medical students: Pathology 1 (b), one quarter; Pathology 3, three quarters.)

1. General Pathology (b).—A course of lectures, demonstrations, and laboratory work which covers chronic inflammations, granulomata, and tumors. One lecture and two laboratory periods of two and one-half hours each, per week. Continuation of course offered by Department of Bacteriology and Experimental Pathology. Pre-requisites: Histology, Bacteriology, Pathology 1 (a).

6 hours, autumn or spring quarters (Total—66 hours)

(OPHÜLS, SMITH) MW 1:30-4, T 8-9

2. General Pathology.—An elective course of weekly recitations covering the same ground as course 1.

1 hour, autumn or spring quarter (Total—11 hours) (SMITH)

Time to be arranged

3. Special Pathology.—A course of demonstrations of fresh and preserved gross and microscopical specimens, illustrating selected chapters on Human Pathology. Part of the work will be devoted to the technique of postmortem examinations. Diagnostic work will be done in the spring quarter. Pre-requisite: General Pathology (a) and (b).

4 hours, all four quarters (only three quarters required; total—44 hours per quarter; 132 hours required) (OPHÜLS, ———)

Th 2-4, S 10-12

4. General Pathology (a).—A course covering the same ground as the course offered in the Department of Bacteriology and Experimental Pathology at Stanford University. Two laboratory periods of three hours each and two lecture hours. (Optional).

8 hours, summer quarter (Total—88 hours) (OPHÜLS)

MW 1:30-4:30, TTh 8-9

5. Research Work in the Pathological Laboratory.—Students wishing to do special work in the Pathological Laboratory should have finished course 1. They should consult with the Executive of the Division in regard to the selection of a proper subject for investigation. As the laboratory accommodations are limited, students must do a reasonable amount of work, otherwise the privilege will be with-

drawn. A deposit of \$10 will be required to cover such material as is used by the student in the course of his work. Such part of this as is not drawn against will be refunded on the completion of the work undertaken. Work may be undertaken during any of the four quarters. The same regulations apply to work on theses or for advanced degrees in the Division, except that in the latter case the student also should have finished course 3. (Optional). (OPHÜLS)

VIII. DIVISION OF PHARMACOLOGY

ALBERT CORNELIUS CRAWFORD, Professor.

CHARLES GEORGE MACARTHUR, Assistant.

1. Pharmacology and Materia Medica.—In this course emphasis is placed on the laboratory work which is a pre-requisite to the more didactic part of the subject which is given to students with Junior standing. The laboratory work will be given in the autumn and spring quarters. (a) There will be two laboratory periods a week, of three hours each. In the same quarters there will be three hours of lecture and quiz work supplementing the laboratory work. (b) Students with Junior standing will be required to take a lecture and recitation course in Materia Medica and Pharmacology of five hours a week, which will be given in the winter quarter.

(a) 9 hours, autumn or spring quarter (Total—99 hours); (b) 5 hours, winter quarter (Total—55 hours) (CRAWFORD)

(a) TThF 1:30-4:30; (b) M 3-5, Th 4-5, F 1—

2. Graduate Course.—The laboratory is open throughout the year to properly qualified students who wish to carry on independent work in Pharmacology. (CRAWFORD)

3. Pharmacy.—A short optional course of demonstrations in pharmacy will be given. This will enable the student to understand better the advantages and dangers of combining drugs. (———)

IX. DIVISION OF PHYSIOLOGY

OLIVER PEEBLES JENKINS, Professor Emeritus.

ERNEST GALE MARTIN, Professor.

JAMES ROLLIN SLONAKER, FRANK WALTER WEYMOUTH, Assistant Professors.

(The numbers of the courses correspond to those under the Department of Physiology as outlined in the Register.)

3. Physiology of Muscle, Nerve, and the Central Nervous System.—An advanced study of the adaptive mechanisms of the body. Text-book: Howell's Physiology. Three lectures and six laboratory hours per week.

5 hours, winter quarter (Total—99 hours) (MARTIN, SLONAKER)

4. Physiology of Circulation, Respiration, Digestion, and Metabolism.—An advanced study of the maintenance mechanisms of the body. Text-book: Howell's Physiology. Three lectures and six laboratory hours per week.

5 hours, spring quarter (Total—99 hours) (MARTIN, SLONAKER)

5. Physiology of the Sense Organs.—An experimental study of these organs. Text-books: Herrick's Introduction to Neurology; Howell's Physiology. Three lectures and six laboratory hours per week.

5 hours, autumn quarter; repeated winter quarter (Total—99 hours) (WEYMOUTH)

6. Journal Club.—A study of physiological literature, with oral and written reports. Recommended for Medical students. One hour weekly. (Optional).

1 hour, each quarter (Department Faculty)

7. Advanced and Research Courses in Physiology are open to those who are qualified to take them up.

X. DIVISION OF SURGERY

ADOLPH BARKAN, Professor, Emeritus.

STANLEY STILLMAN (Executive), EMMET RIXFORD, Professors.

LEONARD WHEELER ELY, Associate Professor.

RUFUS LEE RIGDON, ALBERT BROWN MCKEE, EDWARD CECIL SEWALL, Clinical Professors.

FRANK ELLSWORTH BLAISDELL, JOHN FRANCIS COWAN, Assistant Professors.

LEO ELOESSER, PHILIP KINGSNORTH GILMAN, HARRINGTON BIDWELL GRAHAM, HARVARD YOUNG McNAUGHT, GEORGE ROTHGANGER, Assistant Clinical Professors.

JOHANN ADOLPH BACHER, HANS BARKAN, JAMES EAVES, HARRY LESLIE LANGNECKER, CAROLINE B. PALMER, Clinical Instructors.

HOWARD FELIX ADLER, JOHN ROBERT BURROWS, JAMES ROOT DILLON, SYLVAN LEWIS HAAS, ROSS WALLACE HARBAUGH, CLARENCE ELMER HYDE, LESTER O. KIMBERLIN, JOSIAH H. KIRK, JAMES HUGH McCLELLAND, WILLIAM O. MONTGOMERY, HAROLD STAATS MOORE, CHESTER HOWARD WOOLSEY, GEORGE SCOTT WRINKLE, Assistants.

SUBDIVISIONS

OPHTHALMOLOGY

GENITO-URINARY DISEASES

ORTHOPEDICS

OTOLOGY, RHINOLOGY AND LARYNGOLOGY

GENERAL PLAN OF INSTRUCTION

Instruction in the Division of Surgery commences in the sixth quarter in the Medical School in San Francisco.

The course in Principles of Surgery (Surgery 1) is a pre-requisite to all of the courses in this Division. Courses 2, 3, and 4 are also given in the autumn quarter, and all four of these courses are repeated in the spring quarter.

On completion of these courses, and after satisfactory examination, students will be admitted to third year standing.

Students will be admitted to fourth year standing after having completed courses 5, 6, 7, 8, 9, 10, 11, 12, 13, and having passed satisfactory examinations in the same.

Before graduation, students of fourth year standing are required: (1) to complete the following prescribed courses: 14, 15, 19, 20, 21, 22; (2) to have completed, in addition, at least three hours elected from any two of the following courses: 16, 17, 18; (3) to have passed satisfactory examinations in the same.

COURSES FOR SECOND YEAR MEDICAL STUDENTS

1. Principles of Surgery.—Recitations, demonstrations and laboratory work, utilizing clinical and pathological material from the out-patient clinics and Lane Hospital, and preparations from the museum and laboratory of Surgical Pathology.

4½ hours, autumn or spring quarter (Total—50 hours)

(COWAN or GILMAN) MWF 10:30-12

2. Fractures and Dislocations.—Recitations, study of X-Ray plates, and demonstrations of fractures and dislocations. All the important fractures and dislocations are produced on the cadaver and subsequently demonstrated by dissection.

2 hours, autumn or spring quarter (Total—22 hours)

(BLAISDELL) W 8:30-10:30

3. Surgical Anatomy.—In this course anatomy is reviewed from the standpoint of the surgeon, with special reference to the relation of important structures to each other and to the surface markings of the body. Twice a week for eight weeks.

1½ hours, autumn or spring quarter (Total—16 hours)
(BLAISDELL) MW 4-5

4. Surgical Diseases of Extremities.

2 hours, autumn or spring quarter (Total—22 hours)
(ELOESSER or COWAN) TTh 11-12

COURSES FOR THIRD YEAR MEDICAL STUDENTS

5. Surgical Diseases of the Abdomen.

2 hours, autumn or spring quarter (Total—22 hours)
(STILLMAN or GILMAN) MF 4-5

6. Surgical Diseases of Head and Neck.

2 hours, winter quarter (Total—22 hours) (RIXFORD) TF 4-5

7. Surgical Diseases of Thorax.

1 hour, spring quarter (Total—11 hours) (COWAN) F 4-5

8. Surgical Clinic—Set Clinic, Lane Hospital (Two quarters required):

Anaesthetics: In connection with the clinical work, students are assigned in rotation, so that each one shall administer 10 anaesthetics under the supervision of Dr. Caroline Palmer or Dr. John Burrows, Anaesthetists to Lane Hospital. Dr. Palmer also gives a course of three lectures on the administration of anaesthetics.

3 hours, winter and spring quarters (STILLMAN) or summer and autumn quarters (COWAN or GILMAN) (Total—66 hours)

TTh 11-12:30

9. Outpatient Clinic (Two quarters required).

2 hours, autumn, winter, and spring quarters (STILLMAN or ROTHGANGER); summer quarter (COWAN or GILMAN) (Total—44 hours)

TW 10-11

10. Surgical Ward, Lane Hospital (Two quarters required).

1 hour, autumn and winter quarters (COWAN) or spring and summer quarters (GILMAN) (Total—22 hours) Th 8-9

11. Surgical Laboratory—Tumors.

3 hours, autumn or summer quarter (Total—33 hours)
(COWAN or GILMAN) T 2-5

12. Surgical Laboratory—General Surgical Pathology (Two quarters required).

3 hours, autumn and winter quarters (COWAN and ELY) or spring and summer quarters (GILMAN and ELY) (Total—66 hours) W 2-5

13. Preliminary Ophthalmology.—Lectures on the relation of eye symptoms to general medicine and practice in the use of the ophthalmoscope.

1 hour, spring or autumn quarter (Total—11 hours)

(McKEE or BARKAN) M 3-4

COURSES FOR FOURTH YEAR MEDICAL STUDENTS

14. Surgical Clinic, Lane Hospital.—Class limited to 12.

3 hours, autumn or winter quarter (STILLMAN); spring or summer quarter (COWAN or GILMAN) T 11-12:30, S 8:30-10

15. Surgical Clinic, San Francisco Hospital.

4 hours, autumn and winter quarters (RIXFORD); spring and summer quarters (RIXFORD or ELOESSER)

(Three quarters selected from courses 14 and 15 required. Two quarters may be taken at the Lane Hospital and one at the San Francisco Hospital, or vice versa, as the student may elect. Total—110 to 121 hours)

16. Outpatient Clinics.—Class limited to twelve. (Elective).

1 hour, any quarter (Total—11 hours)

(STILLMAN or ROTHGANGER) W 9-10

17. Wards of Lane Hospital.—Class limited to twelve. (Elective).

1 hour, any quarter (Total—11 hours) (COWAN or GILMAN) W 9-10

18. Operative Surgery on the Cadaver.—Class limited to eight. (Elective).

2 hours a week for 6 weeks, winter or summer quarter (Total—12 hours) (EAVES) Th 3:30-5:30

19. Orthopedic Surgery.—Class limited to twelve. Clinics and demonstrations.

3 hours, any quarter (Total—33 hours)

(ELY, LANGNECKER) MF 10:30-12

20. Genito-Urinary Surgery.—Class limited to twelve. Recitations and clinics. (Three quarters required.)

2 hours for 9 weeks, autumn, winter, and spring quarters, Lane Hospital (RIGDON); autumn, winter, and spring quarters, San Francisco Hospital (———) W 10-12

(One quarter each is required at Lane Hospital and the San Francisco Hospital. Third quarter may be at either hospital the student may elect. Total—54 hours)

2 hours, summer quarter, clinics only, Lane Hospital

(WOOLSEY, DILLON)

A course limited to two students will be given in the outpatient clinic 6 hours a week for 8 weeks in the summer quarter.

(WOOLSEY, DILLON)

21. Ophthalmology.—Lectures and clinics. (Three quarters required.)

2 hours for 9 weeks, autumn, winter, and spring quarters (Total—

54 hours); 2 units, summer quarter, clinics only.

(McKEE, BARKAN) T 1:30-3:30

22. Otology, Rhinology, and Laryngology.—Lectures and recitations. (Three quarters required.)

*1 hour, autumn, winter, and spring quarters (Total—33 hours)

(SEWALL) Th 1:30-2:30

(In addition 33 hours of clinic work in sections not to exceed twelve.)

Any quarter (McNAUGHT, BACHER, KIRK) Th 2:30-3:30

A course limited to two students will be given in the outpatient clinic 6 hours a week for 11 weeks in the summer quarter.

(McNAUGHT, BACHER, KIRK)

A clinical course will be given at the San Francisco Hospital.

3 hours, spring quarter (GRAHAM). Either of these courses may be substituted for the above 33 hours of clinic work.

23. Special Courses.—(a) Through the co-operation of the various clinics and laboratories, opportunity is offered advanced students and physicians to make a special study of functional testing of the ear, tubercular lesions of the larynx, anatomy of the ear, nose, and throat, special bacteriology of the upper respiratory tract, Roentgen Ray diagnostic methods, and of performing operations upon the cadaver.

(SEWALL, McNAUGHT, BACHER, KIRK, MOORE, BLAISDELL, DICKSON, BOARDMAN)

(b) Special courses will also be offered to well trained physicians in the laboratory of Surgical Pathology and in the outpatient clinic and hospitals. Such students may register for advanced degrees or as special workers.

(STILLMAN, RIXFORD, BLAISDELL, ELY, COWAN)

MEMORIAL CHURCH

The Rev. DAVID CHARLES GARDNER, Chaplain.

LOUIS H. EATON, Organist.

Morning prayers are said daily at 7:45 a.m., followed by a short address. In this service students take part. Divine service is held on Sunday morning at 11 o'clock.

UNIVERSITY CHOIR

LOUIS H. EATON, Organist and Director.

The Choir sings at the morning service each Sunday in Memorial Church, the music consisting of anthem, chant, and hymns.

1 unit per quarter

Rehearsal Th 7:35

During the winter quarter a larger separate choir is formed for the performance of one of the great oratorios.

1 unit, winter quarter

Rehearsals as arranged

MILITARY TRAINING

JENS BUGGE, Major, U. S. Army, Retired, Professor.

AUGUST BARTELS, First Sergeant, U. S. A., Retired.

GEORGE H. BATES, Sergeant, U. S. Infantry, E. H. JEWELL, Sergeant, U. S. Infantry, Instructors.

Beginning with the academic year 1917-18 military training or physical drill will be required of all undergraduates during the first two years of residence, and the satisfactory completion of the work will be a prerequisite to graduation. After a student has registered for one or the other of the courses he must complete the year in that course, if he continues at the university. After having completed two years of training a student may be recommended for further training in the advanced course, which will require five hours per week and for which the student will receive two credits per semester for a satisfactory completion of the work. Any student taking the advanced course may secure an allowance from the government of about nine dollars per month, provided he agrees in writing to attend the summer camp which takes place after the school year is over.

ARMS AND EQUIPMENT.—Will be furnished by the government except such small articles as insignia of rank and collar and cap ornaments. Students will be held responsible for the proper care of the property issued to them, but only when it is injured or destroyed through the fault of the student will he be required to pay for it.

INSTRUCTION

1. First and Second-year Men.—Physical drill, Butt's Manual, and Koehler's physical drill; infantry drill, including the school of the battalion; bayonet combat; field engineering: intrenchment on the sand table and also on the ground; map reading, by use of sand table and maps; target practice: preliminary drills in aiming, sighting and position, fire direction and control, gallery practice and range practice; first aid, personal hygiene, and camp sanitation lectures; security: talks on patrolling, outposts, advance and rear guards, with practical illustrations; combat, including the handling of a battalion in attack and defense, with practical illustrations; special talks: military policy of the United States, organization, supply, artillery and machine guns, cavalry and aeroplanes. (Three hours per week.)

Each quarter (BUGGE, BARTELS, BATES, JEWELL) MWF 4:15-5:15

2. Advanced Course.—Military Art—Practical duties of officers and non-commissioned officers in connection with the work laid down for the first- and second-year men; military sketching. Theoretical—Minor tactics; field orders; company administration; property accountability.

2 units, each quarter (BUGGE, BARTELS, BATES, JEWELL)

MTWThF 4:15-5:15

MILITARY BAND.—In addition to the Stanford Concert Band, to be constituted as heretofore, there will be organized a Military Band of about thirty pieces, as a part of the Reserve Officers' Training Corps of the University.

The requirements laid down by the War Department are that the members of the Band must take the regular course in Military Training. This means that the members of the Military Band will be required to master the individual instruction in regard to drill and to take all the lectures in the course. After the individual instruction is completed the Band will be allowed to practice their music during the drill hour.

It will be seen that a freshman or sophomore who is a member of both bands will fulfill the requirement of taking either military training or physical exercise by belonging to the military band and will receive one unit of credit for his work with the concert band as heretofore.

PHILOSOPHY

HENRY WALDGRAVE STUART, Professor.

HAROLD CHAPMAN BROWN, Associate Professor.

[Courses 1 and 7 only are open to first-year students; courses 1 to 5 inclusive presuppose no previous work in the department.]

1. Elementary Logic.—The principles of Deductive and Inductive Logic, with special attention to the important types of fallacy.

5 units, autumn or summer quarters (Autumn, STUART; summer, BROWN) MTWThF 8

2. Elementary Ethics.—A short survey of the morality of primitive peoples as compared with more developed forms of morality. The important historic theories as to the criterion for good conduct. The working principles of good conduct.

5 units, winter quarter (STUART) MTWThF 10

3. History of Philosophy.—The development of philosophical theories from the early Greek period to the end of the eighteenth century in Germany, with a brief outline of philosophical movements in the nineteenth century. Attention will be given throughout to the relations of philosophy with social and political conditions and with science, literature, and religion.

4 units, autumn and winter quarters (BROWN) MTThF 9

4. Modern Scientific Conceptions of Nature and Mind.—A study of current views of cosmic structure and the place of man and his activities in nature, in the light of recent developments in physical chemistry, evolutionary biology, and psychology.

4 units, autumn quarter (BROWN) MTThF 10

5. Esthetics.—The origins and nature of art. Its significance for religion, morality, and social life. The rise of art forms. Contemporary theories of esthetics.

5 units, spring quarter (BROWN) MTWThF 8

6. Philosophy of the Nineteenth Century.—The development of philosophical problems in France, Great Britain, and Germany will be studied in successive years in relation to the particular national genius and the conditions under which they arose. The topic for 1917-18 will be British philosophy since Hume. Prerequisite: course 3, or special permission of the instructor for suitably qualified third- or fourth-year students.

3 units, spring quarter (BROWN) TThF 9

7. Advanced Logic.—Methods of investigation in use in the natural and social sciences, and the cardinal assumptions and principles on which these methods are based. Prerequisite: course 1 or an equivalent.

4 units, winter quarter (STUART)

TWThF 8

8. The Social Order and the Individual.—Insect and animal "societies" and the types of human social organization. Social authority and individual initiative. The political obligations of the individual and the ethical basis of political institutions and of law. Democracy, aristocracy, and absolutism. A continuation of course 2; open on approval to students otherwise qualified. Alternate with course 9.

4 units, spring quarter (STUART)

[Not given in 1917-18.]

9. Religion.—The psychological and social origins of religion. The relations of religion to science, to morality, and to philosophy. The distinctive content and characteristics of the great religions. Prerequisite: course 2, 3, or 4, or an equivalent.

4 units, spring quarter (STUART)

MTWF 10

10. The Problems of Contemporary Philosophy.—A survey of the main problems of General Philosophy as presented in the recent literature. Pluralism and Monism; Empiricism and Absolutism; Realism, Idealism, and Pragmatism. Open to third- and fourth-year students on approval.

4 units, spring quarter (STUART)

MTWF 11

11. The Development of Philosophy in America.—A study of the form that European philosophies have taken in America and the beginnings of more characteristically American ways of thinking such as Pragmatism and the New Realism.

4 units, summer quarter (BROWN)

MTThF 9

12. Seminary.—Studies in the meaning and logical character of certain concepts in the social and natural sciences. *Creative Intelligence* (Holt, 1917) will serve as a general outline. Topics may be chosen for special study as follows:

a. *In the social sciences and history.*

Autumn quarter (STUART)

By arrangement

b. *In the natural sciences and psychology.*

Winter quarter (BROWN)

By arrangement

PHYSICAL TRAINING AND ATHLETICS

MEN

HERBERT ROWELL STOLZ, Assistant Professor of Physical Training and Personal Hygiene.

WILFRED HARRY MALONEY, Instructor in Soccer Football, Boxing, and Fencing.

ERNESTO RAY KNOLLIN, Instructor in Formal Gymnastics.

ERNST BRANDSTEN, Instructor in Swimming.

RUSSEL T. WILSON, Instructor in Baseball and Basketball.

RURIC RUSKIN TEMPLETON, Instructor in Track Athletics and Rugby Football.

It is the aim of the Department of Physical Training and Athletics to afford the opportunity for pleasurable and beneficial exercise for the men of the University. Commencing with the academic year 1917-18 all undergraduates will be required to devote three schedule hours per week for the first six quarters either to physical or military training. In physical training students must register in regular classes, and satisfactory attention as well as attendance will be required. Students entering with advanced standing may offer equivalent training in other colleges or universities in whole or partial fulfillment of this requirement.

ENROLLMENT.—Enrollment in physical training classes takes place from 9:00 a.m. till noon and 2 p.m. till 6:00 p.m. on the two days following registration day in each quarter. The physical training is arranged in a system of groups, each group containing one or more forms of exercise. For those who are fulfilling the physical training requirement enrollment must be completed and a group finally selected within one week from the first day of each quarter. Any one of the following groups may be selected:

Group	Days	Time	Exercise
1	MWF	10 to 11	Track, swimming, apparatus.
2	TThS	or	Basketball, swimming, tumbling.
3	MWF	11 to 12	Boxing, swimming, soccer.
4	MWF	2 to 3	Elementary swimming, soccer, tumbling.
5	TThS	2 to 3	Elementary swimming, soccer, apparatus.
6	MWF	4 to 5	Rugby Football, swimming, boxing.
7	MTTh	4 to 5	Track, soccer, apparatus.
8	MWF	4 to 5	Baseball, tumbling, boxing.

9	MTTh	}	4 to 5	Basketball, swimming, apparatus.
10	MWF		4 to 5	Soccer, swimming, apparatus.
11	MTTh		4 to 5	Swimming, water polo, tumbling.
12	MWF		5 to 6	Wrestling, track, basketball.
13	MTTh	}	5 to 6	Apparatus, soccer, tumbling.
14	MWF		5 to 6	Boxing, track, basketball.
15	MTTh	}	5 to 6	Fencing, apparatus, soccer.
16	To be arranged			Corrective exercises.
17	To be arranged		Teachers' training course.	

In each of these groups emphasis is placed upon the sport first mentioned, in which expert instruction is given.

2. Personal Hygiene and First Aid.—Two lectures each week during the first and second quarters. Open to all men of the University.
4 units (STOLZ)

3. Public Health.—The present status of health in the United States; methods of health control. One lecture each week during the third quarter.

1 unit (WILBUR, STOLZ)

PHYSICAL TRAINING COURSE FOR TEACHERS

For those who intend to teach physical training and athletics a graded course extending over three years is offered. This course is given in coöperation with the Department of Education, and for a certificate in physical training the following requirements must be fulfilled:

(1) The following courses in education:	Units
1 Public Education in America.....	3
2 Educational Theory	3
16 Hygiene of the School Child.....	2
20 High School Teachers' Course.....	3
27 Methods and Management of Instruction.....	2
28 Practice Teaching	6
Other courses in Education aggregating four units.....	4
	<hr/>
	23
(2) The following courses in physiology and hygiene:	
Physiology 1 or Zoology 1.....	5
General Hygiene and First Aid.....	4
Public Health	1
	<hr/>
	10

(3) The following courses in physical training and athletics:	Units
1 Gymnastic nomenclature and calisthenics.....	2
2 Gymnastic nomenclature and apparatus exercises.....	4
3 Soccer football and basketball.....	4
4 Gymnastic marching and dancing, boxing, wrestling.....	2
5 Rugby football	2
6 Track athletics, baseball	4
	—
	18

PHYSICAL TRAINING AND PERSONAL HYGIENE

WOMEN

CELIA DUEL MOSHER, Assistant Professor and Director

ETTA L. PARIS, MURIEL VAIL, Instructors.

HARRY WILFRED MALONEY, Teacher of Fencing.

GRETA JOHANSEN, Life Saver and Instructor in Swimming.

INEZETTA HOLT, Gymnasium Assistant.

Beginning with the academic year 1917-18 physical training will be required of all undergraduate women during their first two years at the University.

The aim of Roble Gymnasium, as a laboratory of personal hygiene is to improve the standard of physical health of the women and to increase their mental and physical efficiency; to encourage the habit of exercise; and to stimulate a widespread interest in physical activity of all kinds, especially in those forms which will be available to the women after leaving college. This will be accomplished by conducting organized classes, with instruction for individuals as well as for the various teams.

Every encouragement will be given to women who wish to come to the Gymnasium or any of the out-of-door classes irregularly; but the hours chosen must not interfere with the progress of those who come regularly.

On Fridays special emphasis will be laid on the recreational side of Physical Training. Folk dancing, swimming, tennis, and games will be offered with special reference to those who care to come only once a week.

Dress: black bloomers with white middie blouse and rubber sole regulation gymnasium shoes are needed for classes in the gymnasium and athletic fields. Ballet slippers are needed for all dancing classes except the Friday folk dancing.

1. Physical Training and Personal Hygiene.

Autumn, winter, and spring quarters:

Elementary Gymnastics.....	MWF 11, TThF 5
Elementary Dancing.....	TThS 11, MWF 5
Gymnastics	MWF 10
Intermediate Dancing.....	TThS 10, TThF 4
Advanced Dancing.....	MWF 4
Folk Dancing.....	F 4
By Arrangement.....	MTWThFS 9

SPORTS

Elementary Tennis.....	MT 9, TTh 10, MWS 11, MW 4-6
Advanced Tennis.....	WTh 9, MWF 10, TThF 11
Elementary Fencing	MWF 4
Advanced Fencing	TThF 10
Hockey (1st Term).....	MTWTh 4-6
Basket Ball (2d Term).....	MTWTh 4-6
Baseball and Rowing (3d Term).....	MTWTh 4-6
Volley Ball, field sports, cross country.....	F 4-6
Free play and scheduled games	

Autumn, winter, spring, and summer quarters:

Elementary Swimming	MWF 10, MWF 3:05
Intermediate Swimming.....	MWF 9, MWF 3:35
Advanced Swimming	MWF 4

2. Personal Hygiene.—Four hours per week. Open to all women students. Required of all women taking courses 3 and 4.
2 units, spring or summer quarters (MOSHER) MTTh 10

3. Physical Training Theory and Practice Teaching.—Open only to students who have had Elementary and Advanced Gymnastics, Personal Hygiene 2, Zoology 10, or Anatomy.
2 units, winter and spring quarters (PARIS) By arrangement

4. The Theory and Teaching of Athletic Plays and Games with Supervision of Children's Play.—Open only to students who have had one or more years of Physical Training 1, and Personal Hygiene 2.
2 units, winter and spring quarters (VAIL) By arrangement

Women who purpose attending later a School of Physical Training as preparation for being directors of Physical Training or supervisors of playground work, should take the subjects listed below in addition to the courses offered in this department. Such students will find it advantageous to major in Zoology; if other majors are desired, students are requested to consult the Director.

- ZOOLOGY.—1. Elementary. (5 units)
 4. The Vertebrates (field work). (3 units)
 8. Microscopical Anatomy. (3 units)
 12. Embryology. (3 units)
- ANATOMY.—2. Osteology.
 2, 3, 4. Dissections of (2) Head, Neck, Thorax, (3) the Upper Extremity, (4) Lower Extremity and Abdomen. (2 to 5 units or more)
 9. Topographical Anatomy.
- PHYSIOLOGY.—3. Muscle, Nerve, etc. (5 units, winter quarter)
 3. Blood and Circulation, Respiration, Digestion, Excretion, and Metabolism. (5 units, spring quarter)
- PSYCHOLOGY.—1. Elementary Psychology. (3 units, autumn and winter quarters)
- BOTANY.—11. Field Botany. (5 units, autumn quarter)
- ENTOMOLOGY.—1. Elementary. (5 units, winter or summer quarters)
- ENGLISH.—Vocal Expression. (4 units, any quarter)
- ECONOMICS.—1. Elements. (5 units, any quarter)
- MECHANICAL ENGINEERING.—5. Woodworking.
 (2 exercises a week, one quarter)

PHYSICS

FERNANDO SANFORD, Professor.

FREDERICK JOHN ROGERS, Associate Professor.

ELMER REGINALD DREW, JOSEPH GRANT BROWN, PERLEY ASON ROSS,
 Assistant Professors.

_____, _____, Assistants in Instruction.

1. Mechanics and Properties of Matter.—Including Hydrostatics and Pneumatics. Open only to students who have had algebra and plane geometry. Two lectures and three laboratory periods per week for one quarter.

5 units, autumn or spring quarters (Ross)

Lec. TTh 9; Lab. MTW 1:05-4:05

2. Heat.—Two lectures and three laboratory periods per week for one quarter. Prerequisite: course 1.

5 units, winter quarter (Ross)

Lec. TTh 9; Lab. MTW 1:05-4:05

3. Electricity.—Two lectures and three laboratory periods per week for one quarter. Prerequisite: course 1 or an equivalent.

5 units, spring quarter (Drew)

Lec. TTh 9; Lab. MTW 1:05-4:05

4. Sound and Light.—Including wave motion. Five laboratory periods per week for one quarter. A part of the laboratory time will be given to lectures and the study of text-books. Prerequisite: course 1.

5 units, autumn quarter (BROWN) Lab. MTWThF 1:05-4:05

5. Advanced Physics.—Lectures. Prerequisites: Courses 1, 2, 3, and 4, or their equivalent, or may be taken contemporaneously with course 4.

5 units, autumn, winter, and spring quarters (SANFORD)

MTWThF 10

[Courses 1, 2, 3, 4, and 5 constitute a general course in Physics for major students and others who wish an equivalent training in Physics.]

6a. Mechanics and Heat.—Three lectures and one laboratory period per week. Prerequisite: entrance Physics.

4 units, winter quarter (BROWN)

Lec. MWF 11; Lab. W or Th or F 1:05-4:05

6b. Wave-Motion and Light.—A continuation of Course 6a.

4 units, spring quarter (BROWN)

Lec. MWF 11; Lab. W or Th or F 1:05-4:05

6c. Electricity.—Prerequisites: 6a or 1 and 2.

4 units, autumn quarter (ROGERS)

Lec. MWF 11; Lab. M or T or W 1:05-4:05

6d. Electricity and Electrical Measurements.—A continuation of 6c. Also open to students who have completed course 3.

4 units, winter quarter (ROGERS)

Lec. TS 11; Lab. MT or ThF 1:05-4:05

[Courses 6a, 6b, 6c, and 6d are intended primarily for students of Engineering, but are open to others who have had equivalent preparation.]

7a. Mechanics and Heat.—Three lectures and two laboratory periods per week.

5 units, autumn quarter (DREW)

Lec. MWF 9; Lab. MT 1:05-4:05 or TTh 8-11

7b. Electricity and Light.

5 units, winter quarter (DREW)

Lec. MWF 11

7c. Special Topics.—Lectures on topics in Wave Theory of Light, Electricity in Gases, Radioactivity.

3 units, spring quarter (DREW)

MWF 9

[Courses 7a, 7b, and 7c are intended primarily for students preparing for the study of Medicine, but are open to others.]

8. Mechanical Measurements.—A course in exact measurements of mass, length, time, gravity, elasticity, surface tension, viscosity, etc., using balance, dividing engine, cathetometer, chronograph, etc. Three laboratory periods per week. Prerequisite: Physics 1. Given in alternate years with course 9.

3 units, spring quarter (BROWN) Lab. MTW 1:05-4:05

9. Advanced Optics.—With especial reference to wave-length measurements and the study of spectra. Three laboratory periods per week. Prerequisite: Physics 4. Given in alternative years with course 8. [Not given in 1917-18.]

3 units, spring quarter (SANFORD) Lab. MTW 1:05-4:05

10. Analytic Mechanics.—Prerequisites: Course 1 and differential and integral calculus.

5 units, winter quarter, or 3 units, winter and spring quarters
(ROSS) By arrangement

11. Thermodynamics.—Including advanced topics in Heat. Prerequisites: courses 1 and 2 and calculus.

3 units, winter quarter (DREW) Hours by arrangement

12. Kinetic Theory.—Prerequisites: Courses 1 and 2 and calculus.

3 units, spring quarter (DREW) Hours by arrangement

13. Photometry and Illumination.—Prerequisite: Course 6. One lecture and one laboratory period per week.

2 units, winter quarter (ROGERS) Hours to be arranged

14a. Vibratory Motion.—Prerequisite: Course 10.

3 units, autumn quarter (ROGERS) Hours by arrangement

14b. Wave Motion.—A continuation of 14a.

3 units, winter quarter (ROGERS) By arrangement

15a. Electrical Theory.—Including Electrical Waves. Prerequisites: courses 6 and 10.

3 or 4 units, autumn quarter (ROGERS) By arrangement

15b. Ions and Electrons.—A continuation of 15a.

3 or 4 units, winter quarter (ROGERS) By arrangement

16. The Literature of Physics.—A reading course open to students who have the preparation required for Physics 5. A reading course with weekly reports upon the literature of Physics, especially journal literature and the publications of learned societies.

2 units, any quarter (SANFORD) WF 11

17. Teachers' Course in Elementary Physics.—Prerequisites: courses 1, 2, 3, and 4, or their equivalent.

3 units, autumn quarter (BROWN)

MWF 10

18. Investigation of Original Problems.—Hours to be determined in each case.

(SANFORD)

By arrangement

For graduation in the department the minimum requirement is 60 units of Physics and Chemistry, of which at least 45 units must be Physics. All elementary courses except 6 and 7 are suitable for Physics majors.

THE TEACHER'S RECOMMENDATION.—The minimum requirement is courses 1, 2, 3, 4, or an equivalent, and course 17.

LABORATORY FEES.—Courses 1, 2, 3, 4, 6*d*, 8, 9, \$4 each, per quarter; courses 6*a*, 6*b*, 6*c*, 13, \$2 each, per quarter; courses 7*a*, 7*b*, \$3 each, per quarter; course 18, \$2 per unit, per quarter.

For the summer quarter of 1918 Associate Professor ROGERS proposes to offer two courses on the regular schedule time of the other quarters in which they are given, viz.:

1, 6*a*, or 3, and 10, 14*a*, or 15*a*.

PHYSIOLOGY

ERNEST GALE MARTIN, Professor.

JAMES ROLLIN SLONAKER, FRANK WALTER WEYMOUTH, Assistant Professors.

1. Elementary Physiology.—The structure and functions of the body with special reference to the mechanisms of external adaptation, namely, muscles, nerves, and sense organs. Designed, primarily, for students who are not looking forward to the study of Medicine. Intended to impart a general conception of the relationship of the human body to its environment. Text-book: The Human Body, Martin, Advanced Course, Tenth Edition. Open to students who have at least ninety units of college credit, or forty-five units, including ten in Biology and ten in Chemistry.

5 units, autumn or summer quarters (summer quarter at the Marine Biological Laboratory) (MARTIN, WEYMOUTH)

Lec. MWF 11; Lab. MT 1:05-4:05

2. Elementary Physiology.—The structure and functions of the body with special reference to maintenance, growth, and energy libera-

tion. In this course, special attention will be paid to circulation, digestion, excretion, and metabolism. Although designed to offer in connection with course 1 a survey of the field of human physiology, this course is planned so that it may be taken independently of course 1. Text-book: *The Human Body*, Martin, Advanced Course, Tenth Edition. Requirements for admission the same as for course 1.

5 units, winter or summer quarters (summer quarter at the Marine Biological Laboratory) (MARTIN, WEYMOUTH)

Lec. MWF 11; Lab. MT 1:05-4:05

3. Physiology of Muscle, Nerve, and the Central Nervous System.

—An advanced study of the adaptive mechanisms of the body. Required of majors in the Department. Prerequisites for majors: twenty units of Biology, including Histology; Physics 7, or its equivalent; Chemistry up to and including Physiological Chemistry (Physiological Chemistry may be taken concurrently with this course); for non-majors: twenty units of Biology, Elementary Chemistry, (Elementary Physics is recommended). Text-book: *Howell's Physiology*.

5 units, winter quarter (MARTIN, SLONAKER)

Lec. MWF 8; Lab. MT 1:05-4:05

4. Physiology of Circulation, Respiration, Digestion, Excretion, and Metabolism.—An advanced study of the maintenance mechanisms of the body. Text-book: *Howell's Physiology*. Required of majors in the Department. Prerequisites as in course 3.

5 units, spring quarter (MARTIN, SLONAKER)

Lec. MWF 8; Lab. MW 9-12

5. Physiology of the Sense Organs.—An experimental study of these organs. Required of majors in the Department. Prerequisites as in course 3, with the addition of the anatomy of the sense organs; advanced students of other departments presenting less than these prerequisites will be admitted on recommendation of their major departments, but will be required to register for an extra unit of work, which will be devoted to a study of the anatomy of the sense organs. Text-book: *Herrick's Introduction to Neurology*; *Howell's Physiology*.

5 (or 6) units, autumn or winter quarters (WEYMOUTH)

Lec. TThS 9; Lab. (W) ThF 1:05-4:05

6. Journal Club.—A study of physiological literature, with oral and written reports. Required during two quarters of majors in the Department.

1 unit, autumn, winter, and spring quarters (Department FACULTY)
By arrangement

7. Special Physiology.—An advanced course open to students who have had one of courses 3, 4, or 5. Designed to afford opportunity for the advanced study of selected subjects in Physiology. The work will be planned for the individual student.

1 to 5 units, any quarter (MARTIN)

By arrangement

8. Research in Physiology.

(MARTIN, SLONAKER, WEYMOUTH)

By arrangement

The Department of Physiology offers a major program designed to appeal to students combining with their interest in Biology a desire for training in Physics and Chemistry. The required work in the Department can be taken with advantage only by students who have a considerable foundation of Chemistry and Physics. Candidates for the Bachelor's degree who select Physiology as a major will be expected to take twenty units of preliminary Biology. Zoology 1 and Histology, or their equivalents, will be required, and five units additional from one of the following departments: Zoology, Botany, Physiology, or Anatomy. In Chemistry, the courses preparatory to, and including Organic Chemistry are required as preliminary to the required work in this Department. Course 7 in Physics, or its equivalent, is required, and also, sufficient courses in German or French to give a reading knowledge of one or the other language. Major students in this Department are required to take courses 3, 4, 5, two units of course 6, and ten additional units from courses 7 and 8 (courses in Anatomy or Bacteriology may be substituted for these). Courses 14 and 1 in the Department of Chemistry (Physiological Chemistry) are to be taken before, or concurrently with, the required work in Physiology. Candidates for the degree of M. D., majoring in this Department, should take ten units of Zoology or Botany, and Histology, in fulfillment of the preliminary Biological requirement. The Department requirement for students looking forward to Medicine is designed to enable them to cover the required pre-medical subjects and the work of the first year in the Medical Department of this University, or to fit them to undertake to advantage the work of other first-class medical schools.

PSYCHOLOGY

FRANK ANGELL, Professor.

JOHN EDGAR COOVER, Assistant Professor and Research Fellow in Psychic Phenomena.

JOSEPH EDGAR DE CAMP, Instructor.

GERTRUDE MAY TRACE, Assistant in Instruction.

1. General Psychology.—Lectures and exercises. Not open to first-year students except by permission. Titchener's Text-book of Psychology is used as a book of reference.

3 units, autumn and winter quarters (ANGELL) MWF 11

2. Experimental Psychology.—The experimental method in psychology. Sensation, perception, attention, affection, suggestion, and other complex mental processes will receive careful study through typical experiments. Prerequisite: credit for or enrollment in course 1. (One, two, or three quarters.)

3 units, autumn, winter, spring, and summer quarters (DECAMP)
(Autumn, winter, spring) TTh 1:05-4:05; (summer) MW 1:05-4:05

3. Mental Hygiene.—Some of the practical considerations of psychology and their application to everyday life. The utilization of psychological principles that make for mental efficiency and health. No prerequisite.

3 units, autumn or summer quarters (DECAMP) MWF 8

4. Experimental Psychology.—A course designed for prospective teachers. It deals especially with the learning processes, both simple and complex. Prerequisite: course 1, or equivalent.

3 units, autumn and winter quarters (ANGELL, TRACE)
MWF 1:05-4:05

4a. Experimental Psychology.—A continuation of course 4, but ranging over a wider field. Special studies arranged to meet the needs of individual students.

3 units, spring quarter (TRACE) By arrangement

5. Abnormal Psychology.—A study of various abnormal mental conditions. A gradual development of the subject from the minor manifestations of the hypnagogic state through dreams, hypnotism, hysteria, multiple personality, etc., to the more widely divergent conditions appearing in some of the psychological forms of insanity. Prerequisite: course 1.

3 units, winter quarter (DECAMP) MWF 8

6. History of Psychical Research.—A lecture course. A canvass of opinion on psychical phenomena is made from the daily press, from the popular magazines, and from professional literature; a detailed study of the more important investigations by psychical researchers is made; canons of evidence and of experimental method are adduced; and the present status of the various psychical phenomena is defined. The psychology of testimony, and the nature of scientific proof are consid—

ered in connection with the cases of research chosen for study. Assigned reading, class reports.

3 units, spring quarter (COOVER) [Not given in 1917-18.]

7. Advanced Laboratory Work.

3 units, autumn, winter, and spring quarters (ANGELL)

7a. Space Perception.—Usually presupposes or accompanies course 4.

3 units, spring quarter (ANGELL) MWF 11

8. Statistical Methods.—A lecture and seminar course covering the theory of chance, and the application of statistical methods developed from the mathematical theory of probability to experimental psychology and psychical research. The student is expected to learn by problem-work to apply the methods intelligently, and to appreciate their soundness. Davenport, Yule, Brown, and Titchener are used for reference. Knowledge of algebra is a prerequisite.

3 units, winter quarter (COOVER) TThS 9

9. Mind and Body.—A seminar course. The relations between mind and body are considered from both the philosophical and the psychological points of view. Results of medical and psychological investigation are used to demonstrate an interpretation of the nature of the mind which is free from atomistic or mechanistic implications. Prerequisite: course 1.

5 units, spring quarter (COOVER) MTWThF 10

10. Advanced Psychology.—A discussion of some of the fundamental conceptions of psychology; the correlations which exist between the structure and function of the nervous system and the phenomena of human consciousness; important laws and theories in the field of sensation, attention, association, and affection. Lectures, readings, and discussions. Prerequisite: course 1.

3 units, summer quarter (DECAMP) MWF 10

11. Current Psychology Literature.

1 unit, autumn, winter, and spring quarters (ANGELL) Th 2

12. Animal Psychology.—A study of the behavior of animal forms. The nature, purpose, and significance of comparative psychology; its relation to general psychology; its problems and outlook. The results of investigations relative to (1) sensory discrimination, (2) instinct, and (3) learning will receive careful consideration. The behavior of the earthworm, ant, and rat will be studied in the laboratory. Prerequisites: courses 1 and 2, or laboratory work in a biological science.

3 units, spring quarter (DECAMP) By arrangement

13. Psychical Research.—A laboratory course offering opportunity to attack systematically any problem in the field for which our equipment is adequate.

Autumn, winter, and spring quarters (COOVER) By arrangement

14. Research.

Autumn, winter, and spring quarters (ANGELL) By arrangement

ROMANIC LANGUAGES

OLIVER MARTIN JOHNSTON, Professor.

CLIFFORD GILMORE ALLEN, AURELIO MACEDONIO ESPINOSA, Associate Professors.

STANLEY ASTREDO SMITH, Assistant Professor.

LOUIS PETER DE VRIES, GABRIEL HENRI GROJEAN, Instructors.

JOHN A. SELLARDS, Assistant in Instruction.

The undergraduate courses in the Romanic Languages are planned so as to give students an intimate acquaintance with the modern forms of the languages spoken in the principal neo-latin countries. To this end systematic attention is paid to pronunciation, reading, syntax, and conversation. In the higher courses special emphasis is laid on the study of literature. In order to give students an opportunity to become familiar with the spoken idioms, the majority of the courses are conducted in the language which forms the object of study.

The Department offers advanced courses leading to the degree of Master of Arts and Doctor of Philosophy. The library contains adequate material for graduate courses in French and Spanish literature and philology. The Dante collection is also adequate for graduate work in this subject. The Department also accepts candidates for certification as high-school teachers of French and Spanish in California and provides courses to meet the special needs of such candidates. Either French or Spanish may be selected as a major subject. In addition to the elementary course, which does not count as a part of the requirement, majors in French or Spanish must complete the following courses for the degree of Bachelor of Arts:

- (1) Second-year course (15 units);
- (2) Advanced Composition and Conversation (9 units);
- (3) Courses in literature or philology (30 units);

Of the 30 units required in literature or philology, the student may select 10 units outside of the major subject.

The **TEACHER'S RECOMMENDATION**.—The requirements for the teacher's recommendation are the same as for the Bachelor's degree with the exception of the fact that the 30 units under (3) must include the following courses:

A56 and A57 (or their equivalent), and A65 for majors in French.

B56 and B57 (or their equivalent), and B65 for majors in Spanish.

It is also recommended that course 106 in the Department of Germanic Languages be taken at the same time as A65 or B65. A reading knowledge of Latin and German is highly desirable. Recommendations will be given only on the vote of the Department and will demand a degree of scholarship above the ordinary passing mark.

Some of the courses scheduled for the Summer Quarter extend through only one term of the quarter. Others extend through both terms, but credit will be granted for work done in either term.

In 1917-18 and 1918-19 two sections of First-year French and two sections of First-year Spanish will be given as a part of the regular work of the Department Faculty, with no charge beyond a syllabus fee of fifty cents per quarter. After October 1, 1919, First-year French and Spanish will be given by competent instructors under the supervision of the Department Faculty, and a fee of \$7.50 per quarter will be charged. University credit will be given as at present.

I. ELEMENTARY AND INTERMEDIATE COURSES

A. FRENCH

A1. Elementary French.—Training in pronunciation by means of phonetic symbols, oral work, Ballard's Short Stories for Oral French. The elements of French grammar; the regular verb and the verbs *avoir* and *être*; Fraser and Squair, French Grammar, 20 lessons. Reading from Guerber, Contes et légendes, I.

5 units, autumn quarter (DE VRIES, SELLARDS) MTWThF 8, 9

A2. Elementary French (continued).—Oral work continued. Study of the irregular verbs. Fraser and Squair, French Grammar, to end of Part I. Reading from Kuhns, French Reader for Beginners.

5 units, winter quarter (DE VRIES, SELLARDS) MTWThFS 8, 9

A3. Elementary French (continued).—Thorough review of grammar. Oral work. Reading of the following texts: George Sand's *François le Champi*; Labiche and Martin, *Le Voyage de M. Perrichon*.

5 units, spring quarter (DE VRIES, SELLARDS) MTWThF 8, 9

A21. Second-Year French.—Grammatical drill based on Larive et Fleury: *Deuxième Année de Grammaire française*. Composition

from François, Introductory French Composition. Reading in class of Mérimée, Contes et Nouvelles; Victor Hugo, Ruy Blas. Outside reading of simple texts with written reports in French. Course conducted as far as possible in French.

5 units, autumn quarter (DE VRIES, SELLARDS) MTWThF 9, 10;
5 units, summer quarter (SMITH) MTWThF 9

A22. Second-Year French (continued).—Grammar and composition: same texts as in A21. Class reading: Vigny, *La canne de jonc*; Sardou, *Les Femmes Fortes*. Outside reading with written reports in French. Conducted as far as possible in French.

5 units, winter quarter (SMITH, GROJEAN) MTWThF 9, 10

A23. Second Year French (continued).—Grammar: same text as in A21 and A22. Composition: François, *Alternate exercises in French Composition*. Class reading: Dow and Skinner, *Quelques Contes des Romanciers Naturalistes*; Augier, *Le Fils de Giboyer*. Outside reading with written reports in French. Conducted in French.

5 units, spring quarter (SMITH, GROJEAN) MTWThF 9, 10

A24. French Pronunciation.—Training in French pronunciation by means of practical phonetics. Matzke, *Primer of Phonetics*. Two meetings a week and one hour of practice with the phonograph. This course is of special interest to prospective teachers.

2 units, winter or spring quarters (DE VRIES) MW 1:05

B. SPANISH

B1. Elementary Spanish.—The elements of grammar, composition, and conversation. Reading and interpretation of Spanish texts. Texts for 1917-18: Espinosa and Allen, *Spanish Grammar*, lesson I-XX; Espinosa's *Elementary Spanish Reader*.

5 units, autumn quarter (ALLEN, ———) MTWThF 9, 10

B2. Elementary Spanish (continued).—Texts for 1917-18: Espinosa and Allen, *Spanish Grammar*, lessons XXI-XXXVII; Fontaine, *Flores de España*; Alarcón, *El Capitán Veneno*.

5 units, winter quarter (————) MTWThF 9, 10

B3. Elementary Spanish (continued).—Texts for 1917-18: Espinosa and Allen, *Spanish Grammar*, lessons XXXVII-XLIX; Valera, *El Pájaro Verde*; Valdés, José.

5 units, spring quarter (ALLEN, ———) MTWThF 9, 10

B21. Second-Year Spanish.—Review of grammar, with abundant practice in conversation and composition. Reading aloud in Spanish

with careful drill in pronunciation. Reading and interpretation of Spanish texts, with a minimum of translation. Conversation in Spanish based on the texts read. Bi-monthly tests in translation and written reproduction of Spanish texts or short stories. Conducted mainly in Spanish.

Composition and conversation (MWF). Texts: Wilkins, Spanish Prose Book; Crawford, Spanish Composition; for grammar review and reference, Espinosa-Allen, Elementary Spanish Grammar.

Reading, pronunciation, and conversation (TTh). Texts: Benavente *El Príncipe que todo lo aprendió en los Libros*; Selgas, *La Mariposa Blanca*.

5 units, autumn or summer quarters (Autumn, ESPINOSA, ———) MTWThF 8, 9; (summer, ———)

B22. Second-Year Spanish (continued).—Composition and conversation (MWF). Texts: Espinosa, Spanish Composition and Conversation, Part I. For grammar review and reference, Espinosa-Allen, Elementary Spanish Grammar, or Olmsted-Gordon, Spanish Grammar. Original exercises in Spanish composition. Final examinations on all regular and irregular verbs and the use of the subjunctive.

Reading, pronunciation, and conversation (TTh). Texts: Martínez Sierra, *Teatro de Ensueño*; Valdés, *La Hermana San Sulpicio*.

5 units, winter quarter (ESPINOSA, ———) MTWThF 8, 9

B23. Second-Year Spanish (continued).—Composition and conversation (MWF). Oral drill in conversation and the mastery of a correct pronunciation. Short stories, and original compositions. Advanced Spanish grammar. Texts: Espinosa, Spanish Composition and Conversation, Part II, Burnet, Spanish Syntax.

Reading and interpretation of Spanish texts (TTh). Texts: Galdós, *Doña Perfecta*; Martínez Sierra, *Canción de Cuna*.

5 units, spring quarter (ESPINOSA, ———) MTWThF 8, 9

C. ITALIAN

C1. Elementary Italian.—Grandgent's Italian Grammar. Goggio, *Due Commedie Moderne*.

5 units, autumn quarter (GROJEAN) MTWThF 9

C2. Elementary Italian.—Grandgent's Italian Grammar. Conversation. Wilkins and Altrocchi, *Italian Short Stories*; Goldoni, *La Locandiera*.

5 units, winter quarter (SMITH) MTWThF 9

C3. Elementary Italian.—Review of Grammar. Composition and Conversation. Manzoni, *I Promessi Sposi* (edit. Geddes and Wilkins); Giacosa, *Come le Foglie*.

5 units, spring quarter (SMITH)

MTWThF 9

D. PORTUGUESE

D1. Elementary Portuguese.—Branner, *A Brief Grammar of the Portuguese Language*; Maria de Andrade, *Terceiro Livro de Leitura*.

5 units, autumn quarter (SMITH) [Not given in 1917-18.]

D2. Elementary Portuguese (continued).—Branner, *A Brief Grammar of the Portuguese Language*. Conversation based on A. de Carvalho, *O Pequeno Portueuz*. Reading from Almeida Garrett, *Viagens na minha terra*.

5 units, winter quarter (SMITH) [Not given in 1917-18.]

II. ADVANCED AND GRADUATE COURSES

A. FRENCH

A51. Advanced French Composition and Conversation.—Vreeland and Koren, *French Syntax and Composition*. Larive et Fleury, *Troisième Année de grammaire française* will be used as a basis for grammatical drill. Outside reading and written reports in French.

3 units, autumn or summer quarters (Autumn, GROJEAN) MWF 11;
(summer, SMITH) MWF 10

A52. Advanced French Composition (continued).

3 units, winter quarter (GROJEAN) MWF 11

A53. Advanced French Composition (continued).

3 units, spring quarter (GROJEAN) MWF 11

A54. Cours de Style.—Ouvert aux seuls étudiants possédant une connaissance parfaite des principes essentiels de la Grammaire Française. Themes (A. Baret, *La Troisième année d'Anglais*), Compositions françaises (narrations, descriptions, etc.).

Résumés de chefs-d'œuvre de la littérature française avec commentaire grammatical, en français.

4 units, spring quarter (GROJEAN) MTThF 10

A55. La France de 1789 à nos jours.—Etude de la Constitution de 1875. Les conférences seront faites en français. Lectures et comptes-rendus.

4 units, winter quarter (GROJEAN) MTThF 10

A56. Outline Course in the History of French Literature from the earliest times to the end of the seventeenth century.—Abry, Audic et

Crouzet, *Histoire illustrée de la littérature française*, pp. 1-306. The text will be studied outside of class and periodical tests will be given upon it. Most of the work done in class will consist of the reading and interpretation of representative works of each period. Some outside reading will also be assigned.

3 units, winter quarter (SMITH) MWF 11

A57. Outline Course in the History of French Literature from the end of the seventeenth century to the present time. Abry, Audic et Crouzet, "*Histoire illustrée de la littérature française*," pp. 307-648. Conducted on the same plan as A56.

3 units, spring or summer quarters (SMITH) MWF 11

A58. French Literature in the Seventeenth Century.—Lectures in English on the formation of the classic ideal in France and on the main movements, authors, and works of the classic age. Outside reading and reports.

4 units (SMITH) [Not given in 1917-18.]

A59. The Romantic Movement in France.—Its origins. Rousseau, Bernardin de Saint-Pierre, Mme. de Staël, Chateaubriand. Foreign influences: Germany, England, and Italy. The Romantic Revolution with special reference to V. Hugo and the Romantic drama. Outside reading, reports. Course conducted in French.

4 units, autumn quarter (GROJEAN) MTThF 10

A60. The French Novel.—Lectures in English. Emphasis will be placed on the study of the realistic-naturalistic movement of the 19th century. Extensive reading outside of class and discussion of representative works.

4 units, spring quarter (DE VRIES) MTWF 11

A61. The French Drama.—Lectures on the development of the French drama. Emphasis on the realistic-naturalistic tendencies of the 19th century. Extensive outside reading and discussion of plays of representative modern authors.

4 units (DE VRIES) [Not given in 1917-18.]

A62. Literary Criticism.—Lectures in English on the history of literary criticism in France from the Renaissance to modern times. Emphasis is laid on the nineteenth century.

3 units, autumn quarter (DE VRIES) MWF 11

A63. Renan, Taine, and Sainte-Beuve.—A study of French thought in the 19th century centering around the above authors. The more

important works of Renan and Taine, and selections from Sainte-Beuve will be read by the class.

4 units, winter quarter (DE VRIES) MTWF 11

A64. French Lyric Poetry.—French lyric poetry from the beginnings to the present time, with emphasis on the 19th century. Outside reading and reports. Open to students who have completed A23.

4 units, winter quarter (JOHNSTON) MTWTh 8

A65. Problems of Teaching French.—Practice in the use of the phonetic method as a means of teaching French pronunciation, review of French grammar, lectures on methods of teaching French, pedagogical bibliography, and suggestions regarding available text-books. Practice teaching.

3 units, autumn quarter; 2 units, summer quarter (first term)
(JOHNSTON) (autumn) MTTh 1:05; (summer) MTWTh 1:05

A66. Introduction to the Study of Old French.—Reading and interpretation of old French texts selected from Bartsch-Wiese, *Chrestomathie de L'Ancien Français*, with a study of Old French Phonology and Morphology.

2 units, autumn quarter (JOHNSTON) TF 2:05

A67. French Historical Grammar.—Lectures on Old French Phonology and Morphology.

3 units (JOHNSTON) [Not given in 1917-18.]

A68. French Historical Syntax.—The most important phases of modern French syntax will be studied from a historical point of view. This course is intended primarily for teachers.

2 units, summer quarter (1st term) (JOHNSTON) MTThF 1:05

A69. Old French Literature.—French literature from the beginnings to the 15th century, with emphasis on the literary and social traits. Outside reading and reports.

4 units (JOHNSTON) [Not given in 1917-18.]

A70. French Arthurian Romances.—Lectures on the romances of the Round Table, the legend of the Holy Grail, and the legend of Tristan and Iseut. Outside reading and reports.

2 units, summer quarter (2d term) (JOHNSTON) MTWF 2:05

A71. French Seminary.—Research in Old French literature. During the year 1917-18, the subject for investigation will be the French epic.

3 units, autumn quarter (JOHNSTON) W 1:05-3:05

A72. French Seminary (continued).

3 units, winter quarter (JOHNSTON)

W 1:05-3:05

B. SPANISH

B51. Advanced Spanish Composition and Conversation, A.—Reading of Spanish texts with abundant oral practice and exercises in composition. Original compositions. Texts for 1917-18: Martínez Sierra, *Teatro de Ensueño*; Benavente, *Lo Cursi*. Conducted entirely in Spanish.

3 units, autumn and spring quarters (ESPINOSA) MWF 10

B52. Advanced Spanish Composition and Conversation, B.—Original compositions. Translation into Spanish of selected English prose. Spanish syntax. Conducted entirely in Spanish.

3 units, winter and summer quarters (ESPINOSA) MWF 10

B55. Historia de la Civilización Española.—Conferencias sobre la historia de España y la civilización española: interpretación de la cultura española y del espíritu español en España y en la América española. Historia, política nacional, arte, literatura, renacimiento intelectual.

3 units, spring quarter (————) MWF 10

B56. Spanish Literature from the beginnings to the death of Cervantes.—Outline course.

3 units, spring quarter (ALLEN) MWF 9

B57. Spanish Literature from the Death of Cervantes to the Present Time.—Outline course.

3 units, summer quarter (ALLEN) MWF 8

B58. Spanish Classics.—A study of the principal authors of the classical period. Representative texts will be read of Cervantes, Lope de Vega, Calderón, Alarcón, Tirso de Molina, as well as selections from Ford's *A Spanish Anthology*. Open to students who have completed courses B21, B22, and B23 or their equivalents.

4 units, autumn quarter (ALLEN) MTThF 9

B60. Modern Spanish Novel.—A study of the modern Spanish novel and its relation to the development of the novel in France and other European countries. Lectures and collateral readings.

3 units, summer quarter (ALLEN) MWF 10

B61. Teatro Español Contemporáneo.—(a) Breve resumen de la historia del teatro español en el siglo XIX: Rivas, Gutiérrez, Zorilla, Bretón de los Herreros, Ayala, Echegaray. (b) Estudio de los dramá-

ticos contemporáneos, con atención especial a Jacinto Benavente, Eduardo Marquina y Martínez Sierra.

3 or 5 units, winter and summer quarters (ESPINOSA)

(Winter) MWF 11; (summer) MTWThF 9

B64. Spanish Lyric Poetry.—A study of the various schools of lyric poets, as the Galician, the Italian, the National, the mystic, Gongorism, the French, the romantic, etc.

3 units, spring quarter (ALLEN)

MWF 10

B65. Problems of Teaching Spanish.—A consideration of the important questions of Spanish pronunciation, grammar, reading, and literary interpretations, together with a discussion of the general questions of methods of teaching as applied to the teaching of elementary and advanced Spanish. Pedagogical bibliography and school texts. Practice teaching.

3 units, autumn quarter; 2 units, summer quarter (1st term)

(ESPINOSA) (Autumn) MWF 11; (summer) MTWTh 11

B66. Introduction to the Study of Old Spanish.—Reading and interpretation of old Spanish texts. Lectures on old Spanish Phonology and Morphology, with linguistic exercises based on *El Cantar de mio Cid*. Ford, *Old Spanish Readings*, Biblioteca de Autores Españoles, vol. LVII.

3 units (ESPINOSA)

[Not given in 1917-18.]

B67. Spanish Historical Grammar.—Lectures and study of Old Spanish texts. Hanssen, *Grammática Histórica Castellana*, Halle, 1913.

3 units (ESPINOSA)

[Not given in 1917-18.]

B70. Origins of Spanish Drama.—A history of the drama from the earliest times to its full development with Lope de Vega. Lectures and collateral reading.

3 units (ALLEN)

[Not given in 1917-18.]

B71. Spanish Seminary.—Old Spanish Ballads. Lectures and investigations on special topics.

3 units, spring quarter (ESPINOSA)

T 10-12

B72. Spanish Seminary.—Lope de Vega. Topics assigned to each student.

3 units, autumn quarter (ALLEN)

MWF 10

C. ITALIAN

C51. Dante and the Divine Comedy.—Reading and interpretation of the *Divine Comedy*. Lectures on Dante, the *Divine Comedy*, and

the principal problems of medieval life and thought reflected in the poem. Outside reading and reports. Open to juniors and seniors in all departments.

2 units, summer quarter (1st term) (JOHNSTON) MTWTh 8

C52. Advanced Italian.—Dante, *La Divina Commedia*. Study and interpretation of the text; discussion of the literary problems of the poem.

3 units, autumn quarter (JOHNSTON) [Not given in 1917-18.]

C53. Advanced Italian (continued).

3 units, winter quarter (JOHNSTON) [Not given in 1917-18.]

C54. Advanced Italian (continued).

3 units, spring quarter (JOHNSTON) [Not given in 1917-18.]

E PROVENÇAL

E51. Introduction to the Study of Old Provençal.—Reading of selected passages from Appel's *Provenzalische Chrestomathie*, with a study of Old Provençal Phonology and Morphology.

3 units (JOHNSTON) [Not given in 1917-18.]

F. GENERAL COURSES

F51. Romance Versification.—The fundamental principles of Romance verse structure, with particular attention to French and Spanish. Lectures and practical exercises.

3 units (ESPINOSA) [Not given in 1917-18.]

F52. Phonetics.—[See course 131 in the Department of Germanic Languages.]

JOURNAL CLUB

The instructors in the department and the advanced students meet on the second Thursday of each month for the discussion of the periodicals and new books.

Th 2-3

ZOOLOGY

CHARLES HENRY GILBERT, HAROLD HEATH, GEORGE CLINTON PRICE,
Professors.

JOHN OTTERBEIN SNYDER, Associate Professor.

EDWIN CHAPIN STARKS, WALTER KENRICK FISHER, Assistant Professors.

WILLIS HORTON RICH, Teaching Assistant.

[Courses 1 and 4 may be undertaken without previous preparation in Zoology.]

LELAND STANFORD JUNIOR UNIVERSITY BULLETIN

**Entered at the Post-office at Stanford University, California, as second-class matter.
Issued in February, March, April, May, June, August, and October.**

1. Microscopical Anatomy.—A study of the fundamental animal issues, with drill in microscopical technique.

2 units, winter quarter (HEATH)

ThF 1:30-4

2. Research Work on Invertebrates.—Prosecution of special studies with reference to the classification, anatomy, and life history of invertebrates.

Autumn, spring, and summer quarters (at Marine Biological Laboratory, Pacific Grove) (FISHER)

Units and time by arrangement.

3. O. Advanced Vertebrates.—Advanced studies in systematic vertebrate zoology, including practice in museum methods, in field observations, and in the collection and preparation of specimens with data. To be preceded by course 4.

3 to 5 units, autumn quarter (SNYDER)

MTWThF 1:30

4. Comparative Anatomy of the Vertebrates.—A detailed examination of vertebrate morphology, including dissection of representatives of the several classes of vertebrates, with comparative studies in vertebrate osteology, the nervous and circulatory systems.

5 units, winter quarter (SNYDER)

MTWThF 1:30-4

5. 12. Vertebrate Embryology.—The development of the chick through the first three days of incubation, and the later stages in the development of the mammal.

5 units, autumn and winter quarters (PRICE, RICH)

MTWThF 1:30 to 4

6. 13. History of Zoology.—A course of lectures dealing with the great discoveries in the science of zoology, together with the lives of some of the more prominent zoologists. Open to students who have had 15 units of biological work. Two lectures weekly.

1 unit, spring quarter (PRICE)

Hours to be arranged

7. 14. Primitive Chordates.—Amphioxus, the tunicates, and the lampreys.

3 units, autumn and winter quarters (GILBERT)

Morning hours, by arrangement

8. 15. Fishes.—An examination of the larger groups of fishes and practical work in the discrimination of species.

3 units, spring quarter (GILBERT) Morning hours, by arrangement

16. Advanced Ichthyology.—Special problems in the morphology and classification of fishes will be set for advanced students prepared for such work.

2 to 5 units, autumn, winter, and spring quarters (GILBERT)
By arrangement

17. Journal Club.—Open to seniors and graduate students.

2 units, autumn, winter, and spring quarters (GILBERT)
By arrangement

Major students must before graduation complete courses 1, 2, 4, 5, 6, 8, 11, 12, 14, 15, and 17, one advanced course in Zoology, and course 1 in Botany. Substitution of other courses is permitted in special cases.

Work for graduate and special students will be laid out in accordance with their individual needs and preferences.

Students who look forward to the study of medicine may take Zoology for their major subject and receive the A. B. degree at the close of a four years' course which shall also contain the first year in medicine. The following courses in Zoology will be required of such students: Zoology 1, 5 units; Invertebrate Morphology, 5 units; Comparative Anatomy, 5 units; Vertebrate Embryology, 5 units; Journal Club, 6 units.

THE TEACHER'S RECOMMENDATION.—The Department recommendation for High School teaching in Zoology requires the completion of the following subjects: Zoology 1, 5 units; the Morphology or the Systematic Study of the Invertebrates, 5 units; the Vertebrates, 5 units; Comparative Anatomy of the Vertebrates, 5 units.

THE ZOOLOGICAL COLLECTIONS

The ZOOLOGICAL MUSEUM contains a very full representation of the fishes of North America, and includes among others a valuable series of the deep-water fishes of the Pacific, and large collections from the West Indies, the Hawaiian Islands, Bering Sea, Japan, the coasts of Mexico and Central America, and the Galapagos Islands. The museum contains also a large representation of the reptiles, batrachians, birds, and mammals of California and adjoining States. The collection of marine invertebrates is rich in Pacific echinoderms and crustacea, and contains a good working nucleus in the other principal groups. The series of deep-sea forms is especially valuable.

LABORATORY FEES.—Courses 1, 4, 5, 11, and 12, \$5 each quarter; other laboratory courses \$3 each quarter.

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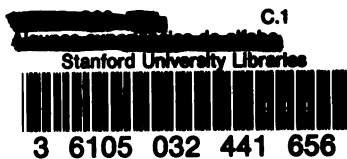
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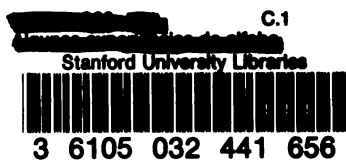
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